IN THIS ISSUE: Publicity in the Electrical Industry

JOURNAL OF ELECTRICITY

VOL. 43 NO. 12 SAN FRANCISCO, DECEMBER 15, 1919 PER COPY, 25 CENTS

THE SPIRIT of COOPERATION

EMULATION of nature is the best illustration of "The Spirit of Cooperation."

Man sows the seed: it rains; the sun shines; the earth gives up her blessings which mankind harvests.

No man attains success, or even progress, except by the aid of his fellow man. There is no such thing as an individual succeeding solely by his own efforts.

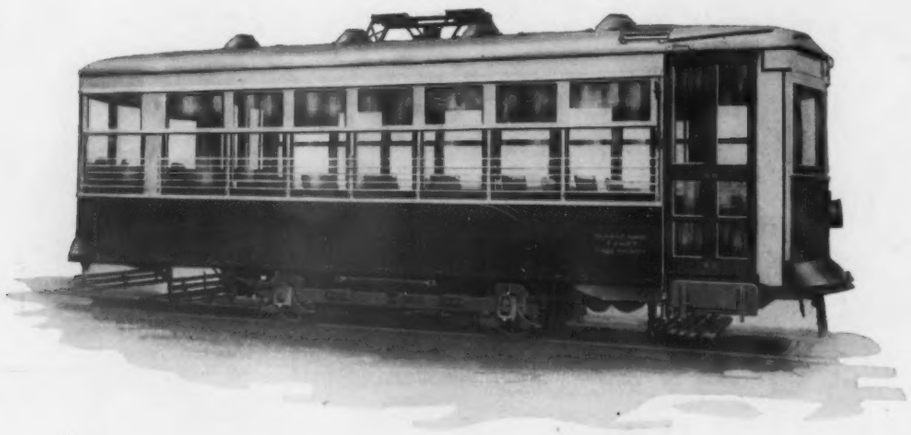
The power company plows the ground and sows the seeds of success for the entire industry. The manufacturer, wholesale distributor, contractor and dealer promote a spirit of fertile good-will; and the public reaps the harvest.

The electrical field is destined to develop and grow in the minds of the people only in such proportion as is fostered by each branch of the industry.

SAN FRANCISCO
OAKLAND
SEATTLE

PACIFIC STATES ELECTRIC CO.

LOS ANGELES
PORTLAND
SPOKANE



More "Kind Words" for Birney Safety Cars

THE frequent and quick service rendered by Birney Safety Cars won the public's favor from the beginning. This valuable asset has resulted in "more riders" and a substantial increase in net revenue. Giving the public the kind of transportation it wants will naturally sell a greater volume of this transportation.

The President of one railway company, which has had these cars in operation for the past year, wrote: "I have heard more kind words regarding the good street car service and the pleasure of the public in it than I ever expected to hear in a lifetime." This is but one of the railway executives enthusiastic over the success of Birney Safety Cars on their lines.

BIRNEY TRADE MARK SAFETY CAR

Over 125 railways are enjoying the profitable results of Birney Safety Car service operating in cities large and small and under all conditions.

THE J. G. BRILL COMPANY

Philadelphia, Pa.

AMERICAN CAR CO., St. Louis, Mo.
G. C. KUHLMAN CAR CO., Cleveland, Ohio.
WASON MANFG. CO., Springfield, Mass.

JOURNAL OF ELECTRICITY

FOUNDED 1887

ROBERT SIBLEY, Editor

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ELECTRIFY YOUR HOME
Buy Electrical Household Necessities in an Electrical Store
THE MEANING OF SERVICE
Western Electric Company
Liberty Electric Company
Pacific Gas and Electric Company
Western Electric Vacuum Cleaner
BRIGHTEN YOUR HOME
Put It to Work
IN YOUR HOME
ELECTRIFY YOUR HOME
HOUSEHOLDS FIRST!
EVERY WEDNESDAY—ONLY 5 CENTS
HOUSEHOLDS FIRST!
Los Angeles Examiner
HOW YOU CAN CUT A
TEN THOUSAND DOLLAR
PUBLICITY MELON
AND GET YOUR SHARE OF THIS BUSINESS
clippings in center are from Prudence Penny's regular Wednesday Section in the Los Angeles Examiner
where Nature works with Man!
Electricity
The Household Servant

A BROAD POLICY of PUBLICITY has always characterized the electrical industry of the West, where the use of electricity has become so intimate a factor in the prosperity of the country.

Under the new stimulus of cooperative advertising, which has now been generally adopted, six thousand pages of advertising have appeared in six months in the columns of California newspapers alone. The papers here represented were among the first to take up the idea of special electrical pages, but others are already following suit, even in the same communities, and the result in popular interest is already being felt.

The center display here shown is a four page spread in red and black which recently appeared in the Los Angeles Examiner as an advertisement of the service which "Prudence Penny," whose column answers questions on household economies, is rendering in the field of electrical appliances. The other pages from the Bakersfield Californian and the San Francisco Bulletin are typical of the electrical advertising features which are now appearing in newspapers throughout the state.

DEC 26 1919 ©CLB457854

JOURNAL OF ELECTRICITY

DEVOTED TO THE UPBUILDING OF THE ELECTRICAL INDUSTRY IN THE WEST AND IN THE COUNTRIES BORDERING THE GREAT PACIFIC

Volume 43 SAN FRANCISCO, DECEMBER 15, 1919 Number 12

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PUBLICITY — the light of directed attention! Like sunlight itself, the bright rays of Publicity cause that which they shine upon to prosper and grow. A mighty civilizing power, vitally related to the worldwide interchange of commodities, making known to all humankind the new inventions and developments of man's genius, Publicity has assumed a truly essential place throughout modern life. In America it has reached its highest attainment; and largely through the energy created by proper publicity of our just aims in the war against Autocracy, our nation was welded together as a unit, and our Victory was made certain through the Liberty Loan drives — constituting unquestionably the greatest advertising campaigns in history. Seeing the beneficent effects of this powerful agency, our national government continued its efforts even after the war, and recently through the Secretary of Labor carried on a nationwide newspaper campaign urging all merchants and manufacturers to advertise now without stint, so that trade may return to its accustomed channels and prosperity may be assured.

With such high authority as its sponsor, Publicity has gained an eminence of usefulness that cannot be assailed. There is no industry that will not profit immensely through its influence. There is no part of the electrical industry, above all, that may justly say, "Advertising cannot help us, for we do not come into direct contact with the public." Every element of our great industry stands in a very real relation to the people which it serves; its wellbeing depends upon a widespread public attitude of interest and esteem. The public must be educated to a full utilization of modern electrical devices now developed and yet to be developed. The people's confidence must be gained, so that the extensions of power projects and upbuilding of manufactories may be generously financed. Contractors and wholesalers, in the ultimate analysis, are as much affected by the public attitude as any elements of electrical enterprise, and they are recognizing their responsibilities by cooperating in concerted advertising campaigns now being waged. Never before has the electrical industry been so awake to the value of proper advertising. The West, with characteristic energy, is leading the way, and in this issue of the Journal of Electricity are set forth some of its recent achievements in this broad field of Publicity.

Educating the Newspaper Electrically

An interesting experiment has been started in California in the establishment of electrical pages in newspapers throughout the state under the encouragement of the Publicity Committee of the Pacific Coast Section, N. E. L. A., and the California Electrical Cooperative Campaign. The direct effect of this massed advertising on the reading public is of the utmost importance, but perhaps an even more wide-reaching achievement is the education of the newspapers to the importance of the electrical industry in the welfare of their respective communities. The newspapers today are most of them ignorant of the importance of an industry which on the whole has not advertised and which has been little understood except by experts.

The different attitude which is already being assumed by the papers carrying these one to four-page spreads of advertising is to be seen in the length of reading notices given by the various papers to electrical events which are called to their attention. Without any derogatory insinuation, it is a fact that the newspaper which has had the idea of an electrical page or electrical section sold to it is much more receptive to such news items and more likely to write them up as events of importance.

In this connection it must be remembered that in a great many cases where small advertisements are run by dealers, the newspaper service department and the newspaper compositor are the ones who are responsible for the wording and setup of the advertisement. Up to recently, many newspaper men never came in contact with any electrical literature in the entire course of their lives. One of the large manufacturers has instructed all salesmen to include the local newspaper office in the round of their calls, after learning that the newspaper officials of some of these towns had never before met any men of electrical interests, either from their own community or elsewhere. These local newspapers have also been placed upon the mailing list of the manufacturer for similar literature to that sent to dealers, with the idea that if the newspaper is to write the advertisement, it should at least be familiar with good samples of electrical advertising art.

With all its shortcomings, the American newspaper wields a powerful influence upon public opinion. The present campaign has the virtue, not merely of arousing the interest of the public, but of arousing the interest of the newspapers and gaining an ally where lay the possibility at least of a neutral adversary.

National Engineering Legislation

Much disappointment has been expressed at the failure of the Senate to pass the water power bill during its last session. It has been slated for early considering at the session just opened, however. The railroad question is to receive first consideration and then it is promised

that the water power bill will be taken up. The Senate bill contains several important changes from the text of the bill passed by the House, chiefly in the limiting of charges which may be made for rental, but it is expected these will be accepted by the House without question. The national engineering societies and individual engineers throughout the country have been giving the bill good support and it is expected that when the problems of Mexico and the peace treaty can be left long enough to consider national needs, the bill will be passed and returned to the House for concurrence in the changes.

The "Jones-Reavis" bill to create a national department of Public Works it has been thought desirable to leave in the background until the campaign is further advanced, and at the request of the Engineers'-Architects' conference on this subject, it has been allowed to remain in committee without action.

A budget of $633,000,000 for national highways is reported by the Bureau of Public Roads for 1920, fully four times the amount spent in 1919, which is just one of the tremendous engineering enterprises scheduled for the coming year. The unquestioned importance of the national issues at stake have provided an excuse for the delay in engineering legislation, but the country has a right now to expect the prompt consideration of its pressing needs.

Standardizing Accounting Systems

The comparison is often made by the public between the financing of public and privately owned utilities. Annual reports are printed in the papers and when it appears that a publicly owned utility has shown a profit for the year under rates no larger than those which a privately owned concern may at the time be asking to have raised, it becomes difficult to comprehend that the need for a greater income on the part of the power company or the street railway may be a legitimate one. The difficulty is due, of course, to the fact that the publicly owned utility may fail to reckon the item of taxes, which expense is thus passed on to the taxpayers as a whole, or may make inadequate provision for depreciation and replacement; may, in fact, in a dozen ways alter its accounting system from that in use by private companies to make a better showing. There is no implication of dishonest or unfair intent in this, but the disadvantage to the privately owned concern is obvious.

It is obvious that strict supervision by the utility-regulating bodies of the various states on the whole has been a good thing. One of the advantages of this regulation has been the necessity of a clear showing of costs and expenditures by all companies on the same basis. Why should not this requirement be extended to the publicly owned utility? It is of value to the citizens of a community to know just where they stand in respect to their water or power system, judging it from the same standpoint that a privately owned utility is judged; it would be of value to the regulating body itself to have this comparative data at hand. From the point of view of the privately owned company, it is a mere matter of justice.

The only way this desirable end may be brought about is to secure the passage of legislation in the various states giving rate regulating bodies the power to demand a uniform system of accounting from all utilities, whether privately or publicly owned. The matter is one which should be followed up by the electrical industry as among those most to be benefited by the measure.

Esperanto and World Communication

"Country-to-country converse is soon to be nothing unusual. As the result of the development of the telephone repeater and other technical advances, people in San Francisco or Portland will be able to talk over the telephone to Buenos Aires with utmost ease." These were the predictions of Major Volney D. Cousins, Equipment Specialist of the Pacific Telephone and Telegraph Company, in a recent address before the San Francisco Electrical Development League. Half-smilingly, Major Cousins suggested that in the near future the long-distance telephone central must be proficient in Esperanto.

The astounding progress in means of communication which this generation has achieved, and which appears likely to be steadily carried onward, makes well worth while the consideration of anything which betters "world understanding." Long-distance telephone, radio, airplane—these have made truer than ever the time-honored saying that the world is a small place, after all. Nations are all neighbors now; and there apparently must be some common neighborhood currency of speech. The numerous proponents of Esperanto have put forward their "scientific language" as a solution for this very real need, and there has been so far no better suggestion. They urge it not as a substitute for the national languages—English, French, Spanish — but simply as an auxiliary medium of thought-exchange, which is deemed just as essential as commodity-exchange in the world life of today.

Great activity has been manifested by the Esperantists in this first year after the war, and their cause has unquestionably gained much ground among elements not before strong in their ranks. Many practical business men have become thoroughly interested in the Common Commercial Language Committee. This organization, with headquarters in New York City, is equipped to transact world business on a large scale through the medium of Esperanto; among its services is the preparation, publication and distribution of catalogs in this "common commercial language." Technical specialists and scientists, too, have of late been looking closely into Esperanto, seeking to find its serviceability in diffusing ideas with necessary exactness and accuracy. In Europe, especially, the technical vocabulary of Esperanto is being systematically expanded.

The Journal of Electricity considers itself fortunate in being able to present a brief yet comprehensive "Grammar of Esperanto," beginning in this

issue. This work, from the pen of Judge W. R. Daingerfield of San Francisco, will serve to indicate the essential nature of the auxiliary language, and should give our readers a more intimate insight into a movement which has as its aim the creation of better and more free communication of thought amongst all peoples.

University of California's New President

With great gratification the Journal of Electricity records the selection of David Prescott Barrows as the new President of the University of California. In these editorial columns a month ago Dr. Barrows was termed "the man of the hour for the presidency of the University," and this editorial support was widely quoted and endorsed in the press of the State. That our judgment has been so completely confirmed by the Board of Regents is satisfying indeed.

It has already been pointed out how important for the electrical industry of the West it is to have men of true vision to bestow strong and sound leadership in the coming years of progress. Dr. Barrows stands eminent in all the qualities of leadership, as it has been our privilege to show, and now that his entrance upon this high office is assured, the electrical industry of California, together with all other progressive communities of interest within the State, congratulate him heartily upon his appointment. Knowing fully the latent resources of the great West, he is sympathetic with engineering research and development that shall bring increased wealth and wellbeing to the land. The institution whose destinies he is called to direct is now in all likelihood the largest of all universities. It demands the leadership of such a man as he, one with the world-viewpoint gained after years of intensive study of the world and its problems.

All honor then to David Prescott Barrows, "a ripe scholar, an able executive, student of nations and men, soldier, traveler, and, above all, a genuine American."

A Tribute to the Electrical Dealer

The woman has been accused of the department store habit. She is credited with purchasing silverware, millinery, groceries and pianos from the same establishment—and the only reason she has not included automobiles and electric kitchen ranges is because the store has hitherto not carried them in stock. But the average department store is now beginning to carry the electric range and is already featuring washing machines and vacuum cleaners in advertising and store display. It is a tribute to the service rendered by the electrical contractor-dealer, therefore, that of about sixty women present at a recent women's club meeting where electrical merchandising was discussed, only one testified that she purchased her electrical ware at a department store. Most of the women present explained that they dealt with an electrical specialist just as they would go to a milliner for their hats, because he knew the technical side of the wares he was handling. They did not feel sure that the girl at the department store knew whether she was selling them a good article or not—and they had found that department stores often carried electrical goods which they had never heard of before and they liked to get important things of that kind from a well known manufacturer. The one woman who favored the department store did so because she could charge any articles purchased there without question. She admitted that time payments were almost as satisfactory, but was not sure that a dealer would grant them on just one purchase.

There are several morals to this frank expression of opinion, but perhaps the chief of them is the value of the publicity which has put the electrical dealer on the map and given him his honored position in the mind of the woman customer.

The Value of Appearances

The importance of cleanliness and neatness in all departments of power company activity has been pointed out by S. M. Kennedy more than once in his suggestions for the establishing of good will between the company and the public. The impression acquired from the slovenly condition of substation back yards or of automobiles bearing the company's name may be unconscious, but it has its effect in the general estimate formed of the public utility as a citizen of the community it serves.

An example of the bettering of a reputation through consistent courtesy and cleanliness is to be seen in the case of the Standard Oil Company. Although dealing in a commodity far from attractive in itself, Standard Oil trucks always look as though they had been newly painted, and it has been said that they may always be counted upon to keep to their own side of the road. The automobile service stations which dot all large cities are always immaculate, and surrounded by the greenest of well trimmed plots of grass. Every man has an interest in the appearance of his community, and cannot help but be favorably impressed by a concern which is so obviously a good citizen. When power company buildings come to be looked upon as show places in their respective communities, the power company's reputation is just so much the safer in the public mind.

IN THE NEXT ISSUE: A New Year in the Electrical Industry

Power Stock Preferred—An Advertising Campaign

BY ROY L. SHURTLEFF

(The psychology of advertising, though much discussed, has not yet become an exact science. For this reason there is more than a passing interest attached to the following account of a successful campaign for the sale of stock which is today held by more California investors than any other issue, with the single exception of Liberty Bonds. The author is a member of the firm of Blyth, Witter & Co. of San Francisco.—The Editor.)

When the firm of Blyth, Witter & Co. purchased from the Pacific Gas & Electric Company $5,000,000 First Preferred Stock, and undertook to sell it without the aid of associates, it realized that it was attacking a rather difficult problem. The problem was not alone the size of the issue—although a $5,000,000 block is rather an unusual amount to be handled by one distributing organization—but $25,000,000 of the stock had already been sold, and largely to the class of buyers with whom the firm was in touch. It was believed that as far as regular purchasers of securities in its territories were concerned, a point of supersaturation had very nearly been reached.

Working Out Plans

Nevertheless, Blyth, Witter & Co. went ahead without aid. Our theory was that since the last block of Pacific Gas and Electric stock had been sold, an entirely new field of investors had been developed through the general transition and redistribution of wealth which had taken place in the country in the last four years. We knew that most of this new wealth was in the hands of people who had never purchased securities other than Liberty Bonds, and felt that the medium to get them to become purchasers of securities in general was such an issue as Pacific Gas & Electric preferred stock, because the company is so well and favorably known not only in California but throughout the country.

Our means of reaching these new investors were twofold:

First, through our regular sales force, which was augmented to work intensively in the various counties in which our offices operate; and

Second, through an advertising campaign.

In attacking the advertising and the sale of this stock, we had to keep this point before us: that we are essentially, and above all else, a conservative financial investment banking house, and all advertising of such institutions of which we had knowledge had been along lines which impressed conservatism upon the reading public, but at the same time had little sales value. We had to keep another fact always before us: that we had $5,000,000 of stock to sell, which would have to be disposed of largely through advertising, and that our advertising must therefore have real selling force. We therefore had to follow a campaign which was conservative, dignified, and yet possessed "human interest" enough to appeal to people who were not financiers.

The advertising campaign was divided into three parts, covering the newspapers, the street-cars, and national magazines. The first and last have always been acknowledged mediums for financial advertising. In the second, we started into new fields. Some of our advisers told us that nobody having money to invest longer rode in street-cars, but we went forward on the contrary theory that not everybody who has $1,000 buys an automobile, and that some of the American people still prefer to lay aside something for a rainy day, and ride on street-cars.

Preliminary Advertising

Our first advertisements in the newspapers were the regular, conventional announcements—run on the financial page. Then we started out to create "atmosphere." Our first cards in the street-cars did not try to sell the stock, but told how good it was. Here is an example:

> **"In the past thirteen years the Pacific Gas & Electric Company has re-invested $34,465,353 of its earnings, which is equivalent to 70% of the Company's surplus earnings during this period.**
>
> **6388 investors consider Pacific Gas & Electric Company 6% Preferred Stock a proper investment for their savings. Why shouldn't you?"**

For the first month our effort was not to pull the money out of the pockets of our readers, but to instill in their minds the safety of Pacific Gas and Electric stock. Our newspaper ads were therefore statistical, and spoke of the size, substantiality, and scope of the company. Our newspaper advertisements were run largely in the general news section, rather than on the financial page. Street-car ads intended to carry out the same thought were also used during the second stage.

The third stage of the campaign started at the end of the first six weeks. It was now the endeavor to create desire and action. We had sought to lay a foundation as to the safety of the Pacific Gas and Electric stock, and now endeavored to fashion this reputation into actual purchase. An advertisement showing a bank check and headed "Here is a Check for You" is illustrative.

Working for Psychological Effects

We then deliberately stopped Pacific Gas and Electric advertising for a time, and substituted therefor advertising of a general nature, offering other securities of the highest integrity, handled by this house. It was felt that this was necessary because, with such a long-drawn-out campaign as we were working on, the investing public, not realizing the size of the issue and the purpose of the campaign, might gain the impression that the stock was a slow mover.

The last stage of the publicity drive took up once more the Pacific Gas and Electric securities and directed the attention of the public to the attractive rate of income. Up to this time our advertising had been devoted to the attractiveness of the issue, the stability of the company, and the general desirability of the stock as an investment. Having laid this basis for action, it was thought advisable to concentrate on the matter of attractive income.

In addition to the usual financial circular, advertising the issue, this firm has just published a twenty-page illustrated booklet on the properties of the Pacific Gas and Electric Company. This contains charts, diagrams, facts and figures calculated to inspire the investor with a desire to possess a block of this stock, which displays such a large factor of safety.

Factors of Success

Now as to the success of handling the sale of this stock in this manner: Inasmuch as the campaign is not yet completed, results cannot be definitely stated. However, we laid down for ourselves a fixed program of progress, and at this writing we are somewhat ahead of it. In the number of new security buyers we have gained, the results have exceeded what we had in mind. We have learned four definite lessons:

First, that financial advertising, in order to hold the interest of the public, must constantly attack from new angles.

Second, that the number of people who will write in, in answer to specific ads, is small; or, rather, that the amount of bonds so purchased is small. The results come from the general impression created. We found that a very small percentage of the people who bought did so as the result of any one ad.

Third, that the advertisement that seemed to bring the best response was the one which told how many other people had bought. It seemed to inspire confidence to know that more California investors owned Pacific Gas and Electric preferred stock than held any other issue except Liberty Bonds.

Fourth, that in the planning of a financial campaign sales effort is a necessary adjunct to the advertising.

Three-fourths of our sales have been made as a direct result from the call by a salesman. Probably only a fraction of these sales would have been made without advertising; but, also, only a fraction of them would have been closed without the work of the salesman.

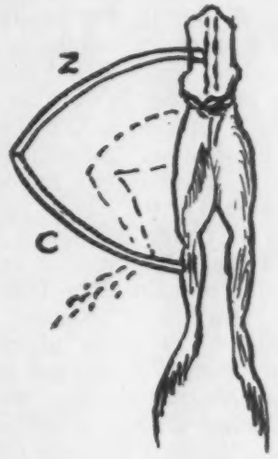
6388 investors consider Pacific Gas and Electric Co. 6% Preferred Stock a sound investment for their savings. Why shouldn't you?
Price $89 per share—yielding 6¾%
BLYTH, WITTER & CO.
MERCHANTS EXCHANGE, SAN FRANCISCO
This Map Shows
How Northern California stands back of your investment in
Pacific Gas & Electric Co.
6% Preferred Stock
Price $89 Share Yielding 6¾%
BLYTH, WITTER & CO.
GOVERNMENT, CORPORATION AND MUNICIPAL BONDS
MERCHANTS EXCHANGE SAN FRANCISCO
It's a Fact—more California investors own this security than any other except Liberty Bonds
Pacific Gas & Electric Co.
6% PREFERRED STOCK
Price $89 share—paying 6¾%
BLYTH, WITTER & CO.
GOVERNMENT, CORPORATION AND MUNICIPAL BONDS
MERCHANTS EXCHANGE SAN FRANCISCO

In spite of statements to the effect that no one who has money to invest rides in a street car, Blyth, Witter & Co. made extensive use of street car cards of this kind to convey to the public interesting general information about the securities being sold.

ENGINEERS OF YESTERDAY—18. GALVANI

(Series Compiled by A. L. Jordan)

If frogs' legs can be made to kick upon touching them with certain metals, does it prove that there is "animal electricity" in the body?



Luigi Galvani (1737-1789) became public lecturer in anatomy in the University of Bologa, Italy, in 1762. A few years later he began experiments with electricity upon the muscles of frogs and made known in 1786 that two different metals, one touching the frog's nerve and the other a muscle, produced a "kick."

His supposition that electricity came from the frog was disproved by Volta (considered in the next of this series of articles), but the "frog experiment" made him famous and his name is perpetuated in the words "galvanic," "galvanize" and "galvanometer."

Publicity and the Power Company

BY I. W. ALEXANDER

(The development of any district is dependent upon the capacity of its power companies. In the following article the two vital needs of the power company — finances and publicity — are discussed with the conclusion that the ultimate responsibility lies with the press. The author is a member of the San Joaquin Light and Power Corporation.—The Editor.)

The press of the West should work just as earnestly and enthusiastically for the sale and safety of power company securities as it did for the Liberty Bond issues. This may seem at first glance a bold and selfish statement, but it is fact nevertheless. Only the sale of power company bonds and stock can fittingly increase the development of this great West. If central stations are not permitted to earn a fair return on invested capital, if power company securities do not sell, and if the latent hydro-electric power of the West is not developed sufficiently to meet the growing demand for it, there is just one answer—the progress and prosperity of the country and its inhabitants will be retarded in proportion directly as the power companies' ability to finance and earn is restricted.

With one exception, truthful publicity is the most vital need of the power companies of the West. This exception is money for the development of additional hydroelectric generating capacity. Were it possible to obtain the necessary publicity the money would soon be available, once the people had the true understanding. Inasmuch as no rich relative is going to die and surprise the utilities with a big inheritance, the deduction that proper publicity is the most important question before the power companies today, is entirely permissible.

Leaders in electrical development and electrical thought have long realized that failure to put their cause before the people is working an unjust hardship upon their companies, but they are powerless to correct the condition. Advertising offers one ray of hope which unfortunately cannot be taken advantage of because of the serious inroads made upon the earnings of power companies during the war years, due to the large increase in operating costs without wholly compensative increase in income. Furthermore, there is an economic reason why advertising paid for with funds subscribed by the central station companies, should not be depended upon for this tremendously important work.

Mr. A. Emory Wishon, president of the Pacific Coast Section, National Electric Light Association, in an address delivered before the Electrical Development League in San Francisco, September 22nd, stated:

> "The greatest problem that faces us today is that of having the public understand what the electrical industry is doing for the nation, but in our opinion this understanding can only be brought about by proving to the individual of this public what the electrical industry is doing for him—what further developments of the electrical industry mean to him in dollars and cents gain and what a delay in electrical developments, due to legislation or other causes, means in dollars and cents loss to his individual business.
>
> "We who have studied the problems of the development of the West, know that the West will not develop ahead of its hydroelectric development. The greater part of the Western territory depends upon hydroelectric pumping for irrigation of its arid lands, if agriculture is to be further extended. If factories are to be located West, cheap power must be obtainable. Any form of legislation, national or state, that delays electrical development, delays the development and prosperity of the West and any thinking electrical man can sit down and figure out just where any particular business loses in dollars and cents when hydroelectric development ceases. Prove your case to the individual by proving where the individual's pocketbook is hurt, when your business is hurt, and you will have a convert who will see that your business is allowed to prosper."

Mr. Wishon stated a generally known fact when he said the greater part of the Western territory depends upon hydroelectric development for irrigation of its arid lands, if agriculture is to be further extended. Therefore, we will bring the example of an agricultural community to the attention of the editor, because there is hardly a newspaper in the West that does not depend upon the support of agriculturists and agricultural communities for its success.

The town of ———— is situated in a San Joaquin Valley county in the center of a rapidly growing and flourishing farming community. During the past few years there has been an influx of homeseekers owing to excellent farming lands selling at very attractive prices. Business has been growing because the newcomers have increased the purchasing capacity of the community. The demands increased upon the merchant, the lumber man, the laundry man, the newspaper, the banker, the hotelman, the phonograph dealer, the pump dealer and all others including, finally but not least, the power company. As the merchant ran out of shoes and clothing he could place orders and increase his stock at will, even though the exigencies of the time compelled him to pay more for his wares. He merely increased his selling price to cover his increased cost and the percentage of profit he deemed necessary to do business on. So with every other line of business—except the power company. As the newcomers established their homes and pumping plants, the available power was quickly depleted and it was an impossibility to put any more on the shelves, so to speak. The only way an additional stock, to take care of more new customers, could be obtained was to build another generating plant or else buy the output of an already established generating plant.

The first of these solutions was impossible, due to war time restrictions and difficulties of financing due to increased costs of operation from war-time prices. To illustrate, permission first had to be gained from the Railroad Commission to advance rates to compensate for loss of earnings. The power companies cannot arbitrarily raise their prices. Secondly, the increase of fifteen per cent in power rates during the war-time period is greatly less than the increase in prices of all other essential commodities which range from 40 to 240 per cent.

The second solution was equally impossible because all the other power companies were confronted

with the same problem. Therefore, the power company remained "sold out" and there was a famine in power. The result was that settlement ceased. When homeseekers could not get power to develop their properties, they decided to postpone their activity until such time as the power was available. In the meantime they have voluntarily come to the office of the power company and made application to buy the power when the company can serve them. At the present time there are more than 120 applications on file in this one office of the power company, and before the ensuing irrigation season has arrived it is a safe prediction that this list will have increased to 200—every one voluntary and without solicitation of any kind.

Now let's see what this means. The records of this company show that for every family that moves into an agricultural community two move into a city. In other words, the increase in population throughout its territory has been two to one in favor of the cities, which means that two new settlers in a city are required to support one new settler on a farm. Therefore, because the power company is physically unable to provide power for the two hundred new pumping plants clamoring to be installed in this particular locality, the city population is being deprived of the addition of four hundred new families.

Two hundred new homes in the farming districts! Pumps and motors, lumber and cement, overalls and shoes, harness and automobiles, groceries and millinery, everything that the human being utilizes.

How about those four hundred new families waiting to be included in the city population? They, too, have to have houses, and shoes and meat and banks and newspapers and moving picture shows and candy and ice cream and what not!

But the business interests of this locality will not participate in the increase until the power company is enabled to develop the power that will permit the installation of those 200 new pumping plants in the farming district and the establishment of those 200 new homes. When this is done, the city population will enjoy its increase. But not until then.

Therefore, think a few moments longer and answer this question: Who is the heaviest loser, the business community or the power company? Why, the business man, of course, and by manyfold. Hence, it is very evident that it is to the best interest of the merchants in any locality to encourage in every way possible the development of the agricultural community surrounding it; and furthermore, when public opinion is so influenced that it restricts the development of a power company, the people themselves are the greatest sufferers.

So in putting the responsibility for the development and prosperity of the country squarely upon the shoulders of the newspaper editor, it is where it rightfully belongs. The editor, who honestly desires to be a constructive element, wield an influence for good, and perform a service to the people and community he serves will not evade it. If his community prospers, his business prospers to a like extent

To the editor in the community above referred to, the addition of six hundred new families will mean a great number of new subscribers, an additional demand upon his advertising columns from local and national advertisers, and best of all the satisfaction gained from having performed a real service by being a factor in community building and an actual contributor to the prosperity and welfare of his public.

It is to be expected, should the press come to the assistance of the power companies, the "howl" will be made by "single-track-thinking" individuals that the press has "sold out"—that is, has been "subsidized by the greedy corporations." A mere statement of fact will expose the fallacy of such a supposition and further justify this action of the press as the only course it can pursue if it is to deal fairly with the power companies and public alike.

The people have placed the complete regulation of all utilities—power, water, gas and transportation—in the hands of a Railroad Commission. This Commission is composed of several members appointed by the Governor, who in turn, has been elected by popular vote of the people. In exercising far reaching jurisdiction over the affairs of these utilities, the Commission approves all rates charged for utility service. Before approved, however, all rates are subjected to most exhaustive investigation by Commission experts. The utilities cannot issue stocks or bonds without the sanction of the Commission. Every dollar received from the sale of all securities must be accounted for, to the satisfaction of the Commission. In the event of protests, public hearings are held at which the contentions of the public and utilities are equally weighed. What better guarantee of a square deal is possible?

All fair-minded people recognize that invested capital must be permitted to earn a fair return, otherwise money for public improvements would not be available. Therefore, it is equally the duty of regulating commissions to maintain a fair earning for the utilities, as well as to obtain rates that are absolutely fair to the consumer. Inasmuch as the utilities are the very lifeblood of any community, no fair thinking man will consent to a popular opinion or agitation that will impair their proper functioning or jeopardizing their stability.

The newspaper honestly endeavoring to promote the best interests of its readers, its advertisers and the community it serves can best accomplish this purpose by becoming an enthusiast for additional hydroelectrical development and the champion of the principle that public utilities are entitled to and should receive a fair rate of earning on the capital invested. The utilities do not care what the rates are just so they return a fair rate of earning. If a low rate will make the necessary earning, the utility is better satisfied because this condition is more pleasing to the public. However, should a high rate be necessary for earning, the people should as freely grant it, and it is reasonable to believe they would were they to know that in so doing they would be only meting out justice and fair play, and furthering their individual interests.

Congenial Contacts

BY S. M. KENNEDY

(The letter, the telephone conversation and the personal interview—these three are the mediums through which the public utility comes in contact with its customers. The general agent of the Southern California Edison Company here discusses the way in which these should be handled in order to eliminate friction and establish friendly relationships between company and consumer.—The Editor.)

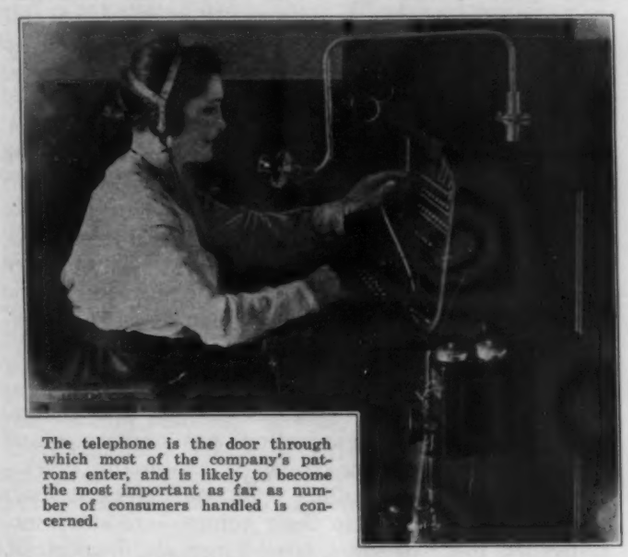
There is a Moslem maxim which runs as follows—"Four things come not back: The spoken word, the sped arrow, the past life and the neglected opportunity." This maxim is a good one for the employe of a public utility corporation to think over now and then, if he has an earnest desire to serve his company and incidentally advance his own interests. There is no greater asset a utility corporation can possess than the confidence of its customers and the good will of the general public, and there is no means whereby a corporation is measured or judged more constantly or more accurately than by "the spoken word" as used by the corporation's officers and employes. This is neither an old adage nor a new theory, but an incontrovertible fact, substantiated by the experience of those who have made a close study of the subject usually termed "Public Relations." Today the manager with progressive ideas values the confidence of the people to a greater extent than he does a franchise; for in a hostile community a franchise is of little value, either as an asset or a means of protection. Consequently the best efforts of all officers and employes connected with a utility company should be put forth to please the people—so that every word and act will carry a suggestion or conviction that corporation men are really human—that they desire to serve the public conscientiously and honestly, and that if mistakes are made and errors are discovered, they will be speedily and willingly rectified. Now, there are three principal ways or angles by means of which the public reaches its conclusions about a utility company, and these may be termed the "points of contact." The first point is letter writing, the second is the telephone and the third is the personal contact. If one were asked, "Which of these points is the most important?" a reply might be given by asking "Which is the most important leg of a three-legged stool?" All points of contact must be carefully protected, otherwise the object to be attained will be postponed or entirely defeated. If two legs of a stool are strong and the other weak, then all are weak. If two of the points of contact in a utility company's organization are fulfilling their functions, and the other is not working harmoniously, then the harm being done in one direction is probably counteracting the good work done in other ways. The different points of contact will first be considered separately, and then as a whole.

Letter writing is an art which may be freely used to please customers and strengthen a business. The writing of letters plays a vital part in establishing harmonious relations.

Letter Writing

If there is any kind of work that requires thoughtful consideration on the part of a business man it is that of writing letters. It was Bacon who said, "Reading maketh a full man, talking maketh a ready man and writing maketh an exact man." However, exactness is not the only consideration in a letter emanating from the office of a utility company. In order to produce the desired effect it must be couched in language which will also convey consideration and courtesy. The writing of letters is of vital importance in connection with the relations of the larger companies with their consumers. It is of more importance to larger companies only because a greater amount of business is transacted by means of letters in the company that numbers its consumers by tens of thousands, than in the company that counts its customers by hundreds. One of the penalties of a company becoming large is that because of a greater and more extensive territory served, patrons cannot always find it convenient to make personal calls and tell of their wants or wishes. Many complaints are forwarded in letters; many inquiries are received and requests made through the mail. A letter in itself is only cold type, dry ink and thin paper. The gesture, the facial expression, the twinkle of the eye and the nod of the head are all absent. Just the naked words are there to do the talking; consequently one must be more than careful in the selection and use of the words that are written. After what has been dictated has been forgotten by the sender, the letter remains in the other fellow's possession, and he may take it up now and again to look at and ponder over it. If it contained anything that hurt when received, it probably hurts more each time it is re-read, and it is more than likely the reader will eventually work himself up to a point of explosion. A hot letter sent in reply to a caustic communication received is poor business. The answering epistle may be cleverly constructed, really smart, and burn with righteous indignation—but what good does it do the company? If the customer who writes a letter has some grievance, real or imaginary, he had better

be conciliated by receiving a reply with full information, if possible, regarding all the circumstances surrounding the alleged cause for complaint. It is bad policy to word a letter, even if the facts seem to justify, that will make a consumer feel humiliated, because he has made an erroneous statement or an unwarranted charge. There is nothing gained by such a method—and on the other hand—more trouble is invited. It is easy for an employe with a candid opinion to eliminate many friends for the company with which he is connected. Requests for



The telephone is the door through which most of the company's patrons enter, and is likely to become the most important as far as number of consumers handled is concerned.

service are frequently received by letter. It is always easy to please if requests are granted upon application—but when they cannot be conceded, or can only be granted under certain restricted conditions, carefully worded letters are essential when replies are sent. Some people have an idea that every public utility company should supply service upon demand. Whenever possible such people should be talked to personally by an employe with a tactful tongue and a patient disposition. But if a letter is to be sent informing the writer that service must be refused, then it should contain a careful and considerate explanation, stating clearly and concisely all the facts, with the thought in mind that the letter so written may not only have to satisfy the customer, but that it also may be passed upon by the Public Utility Commission if the customer should forward it to that body.

Letter writing may be considered a valuable aid in business building, and here again the form or style either wins what is wanted or loses out. Letters are a dignified and desirable means of drawing the attention of selected people to any subject of special interest, and are always productive of good results. Such letters should have the personal touch, and should be neat and attractive in style and diction, carefully avoiding any resemblance to a communication which might be considered general in its character. Letters sent to customers should contain few technical expressions and no abbreviations. Most people are now familiar with kilowatt hours, but few know about K.W.H.'s or K.V.A.'s. The customer wants light or power, not explanations regarding voltage and amperes. Letter writing is an art which may be freely used to please consumers and strengthen a business—but an ill-worded or discourteous letter is much more dangerous than the same number of words when recklessly spoken.

The Telephone

The manager of an electric company who is at all observing, fully realizes how much of the company's business is handled over the telephone and with what rapidity the number of telephone calls increases. This point of contact bids fair to become one day the most important of all in so far as numbers of consumers handled is concerned. Perhaps even today, the telephone is the door through which most of the company's patrons enter to transact their business. It is not difficult to realize how essential it is to keep this door well oiled and well attended. It should be remembered that there are always three parties to a telephone call:

(1) The person calling
(2) The telephone company
(3) The person called

That one or two of these parties do their work properly is not sufficient. Concentration is the watchword of efficiency on the telephone and the co-operation of all three is necessary. It may be assumed that the telephone company does its part perfectly, that its service is sufficient and its operators attentive. For the present, therefore, we will consider only the person calling and the person called, and their relation the one to the other.

Employes of a central station company should have clear and frequent instructions how to talk over a telephone, not only from the business standpoint, but also from the standpoint of mechanical necessity. Again it is affirmed—concentration is essential. No successful conversation was ever conducted by one who tried to telephone and at the same time add a column of figures or talk to a third person. In order to avoid the annoyance of shouting or having to repeat, one should speak directly and distinctly into the transmitter, with the lips close to the mouthpiece. This may seem a point that everyone understands—but such is not the case. It is not uncommon to see a man talking in a direction quite opposite to the location of the transmitter. If the other party hears, it is a miracle. It is also necessary to speak slowly. Half the art of good telephoning lies in deliberate talking. This means clearness and emphasis. In telephone usage, the tone and manner of speech, and the choice of words has everything to do with the feeling created. The spoken word and the inflection conveys whatever idea each party gets of the other. The impression made is entirely by what one says and the way he says it, and here is where the element of courtesy steps in and oils the machinery. But to be really courteous in telephone usage involves more than pleasant tones. When the average man meets the people in whom he is interested, or even casual acquaintances, maybe even those who are strangers, his manner is gracious and his bearing such as to gain and retain friendship and good-will. This same consideration of others should not be forgotten in

telephoning. It is well to assume that the man at the other end of the line is a friend, and that he is entitled to treatment entirely free from harsh tones and abrupt language, such as would not be used in personal contact. A telephone manner may become a valuable asset or an embarrassing liability.

In a large organization there is often great difficulty and much delay in reaching the party wanted. This trouble may be minimized by the adoption of proper methods. The telephone operators in large corporations should be quick to understand what individual or what department is wanted when calls come in. The words "One moment, please," will help things while switching and ringing the individual required. If possible, one switch from the private central is all there should be, but if it is necessary to switch from one operator to another, and then to a third party, no time should be lost in making the connection. The operators of a private exchange should be able to interpret incoming calls, so that mistakes in getting the wrong party may be avoided. Nothing will more quickly wear out a customer who may be trying to do business with a company than to hold a telephone receiver to his ear and have to wait while he is being switched from one office to another, and required to tell his story over again each time he talks to a different party. A telephone call for any person in the office is equivalent to leaving a calling card, and is entitled to a polite response. If the person called is out, the operator should inquire if anyone else will do. If no one else will do, the operator should then say, "Mr. Blank is out, but if you will leave your name and number, he will be pleased to call you immediately on his return."

In answering telephone calls, the operator should use the company's name, the name of the department, or the telephone number, as best fits the situation. "Hello" is not a good word to use, nor is any other expression which does not convey information to the calling party, so that he is in position to proceed without delay. "What is it, please?" although courteous, does not meet the situation as the use of any such indefinite phrase leads to needless questioning and delay. In a large organization, it is particularly needful that each employe should be shown the way he is expected to answer the telephone, and someone should see that the instructions are consistently followed. Telephone calls should be answered promptly. A telephone call neglected means delay for the calling party and perhaps the loss of a call. As far as possible the office boy should be relieved of the work of getting calls for his chief —the party calling should always be ready to talk when the party called answers. It is painful all 'round to have someone "hold the wire" unnecessarily while someone else is attending to other work. Sometimes upon the manner in which what may seem to be a casual call is answered may depend the obtaining of an important piece of business. With a central station company there should always be an expert on the line that receives complaints and another on the line that handles inquiries for service. These lines are equally important and should be well guarded.

It has been assumed that the telephone service itself is perfect—but as is well known, such is not always the case, and poor telephone service may often be a handicap for the central station company to contend with. However, telephone employes can also be polite, and evidently none more so than those who handle the lines and switchboards in China. When a subscriber rings up the exchange in that country, the operator may be expected to ask: "What number does the honorable son of the moon and stars desire?" "Hohi, two-three." Silence. Then the exchange resumes: "Will the honorable person graciously forgive the inadequacy of the insignificant service, and permit the humble slave of the wire to inform him that the never-to-be-sufficiently-censured line is busy?" While this illustration may be a great exaggeration it is much pleasanter to hear than the opposite. It seems that for many in using the telephone it is especially easy to be gruff and abrupt and turn friends into enemies because, maybe, one thinks he is busy. An employe is never so busy that he cannot furnish the public with proper information, and should do so courteously even over the telephone.

Personal Contact

The points of personal contact in the central station company's organization are numerous and important. In the office there are many clerks, and on the outside—calling upon consumers at their places of business, or in their homes—are salesmen, collectors, meter-readers, troublemen and inspectors. And this is not all, for at times there are also linemen, construction men and service men. The work of these men is varied, but in some respects they should all act in the same way. Each should understand his own duties, and leave a good impression on the consumer after he has finished his particular business, so that the next man coming along and representing the same company, may find the consumer in a friendly frame of mind, because of the good treatment received at the hands of employes who preceded. Where all employes should be alike

It is now the community of interest idea that does the business. The manager with progressive ideas values the confidence of the public, and the old attitude of suspicion, based on the belief that the interests of customer and company were antagonistic, is being done away with.

is in seeing that the consumer receives the considerate, careful, attentive and courteous treatment to which he is entitled. If this is consistently accorded to the consumer, the clerk in the office will receive smiles when he is given an error to correct—the salesman will be handed a pat on the back when the customer bestows the order the salesman desires. The collector will be welcomed as a friendly visitor; the meter-reader will be asked to come oftener—and the troubleman and the inspector will be invited in for a cup of tea. As for the lineman, serviceman and construction boss—when these men are careful of the trees, shrubs, flowers and lawns when doing their work, and clean up the mess they usually make before they leave, they will receive commendation that will reach the ears of the president of the company. These conditions may be ideal, but they are not impossible. They may be termed visionary, but in reality they have been known to occur. Politeness is like an air cushion—there may be nothing in it, but it eases the jolts wonderfully. Consideration for and attention to the other fellow's requests may take a little effort, but if regularly practiced they will earn immense dividends. This is the easy way to handle the company's business. It follows the line of least resistance, yet always produces satisfactory returns. The day has long passed when there can exist any "Corporation versus The Public" attitude. It is now the community of interest idea that does the business. The modern public policy is for the utility corporation to concede to its consumers and the public every request that is reasonable, and the result now is that the public in the main abstains from making unreasonable requests. The proper attitude at all points of personal contact can result only in improving the relations between the company and its consumers, and enhancing the value of its service.

It has been said that "Sometime in the future, a nation's civilization will be measured largely in terms of kilowatt-hours consumed per human being per year." If such is the case, then the aim should be steadily to increase the number of kilowatt-hours consumed. At each of the points of contact between the company and the public there are valuable opportunities for making friends and adding new consumers, thereby increasing the demand for the company's product. Each employe should regularly ask himself, "Am I making the most of the opportunities offered so that the public and my company may reap the full benefit?" If every employe would only do just a little more each day what would eventually be the outcome? It is just the additional little margin that wins, whether in time or in toil, in power or in energy, in attention or in earnestness. Just the additional little margin of effort at the points of contact, patiently and tactfully to inform the public concerning those things which they should rightfully know, will mean another step toward that goal all men with high ideals would reach—perfection.

Advertising a Retail Store

(The art of planning advertising which will really sell goods calls for extensive and intensive study of a number of factors. The following discussion of these points formed a part of an address delivered by Frank E. Fehlman before the Associated Advertising Clubs of the World.—The Editor.)

There are four simple things which will guide any retailer in improving his merchandising:

1—Know the merchandise.
2—Know the customer.
3—Know every medium in the town which can be used for advertising.
4—Understand the importance of short, terse, but very specific advertising copy. Of course, this is the hardest thing in this quartette of fundamentals.

The way to study merchandise is to start with a wholesaler or his salesman, who sells you your goods. Before he leaves town, he should be made to dictate a complete description of the merchandise you are buying, which can in turn be given to your salespeople on the arrival of the merchandise and discussed by them in detail.

A Variety of Needs —

The second essential is to know your customer. If you are advertising to millmen, railroad men, or farmers, talk service, wearing qualities, and the adaptability of your merchandise to the lives of these customers.

Selling a $35 serge suit is entirely different from selling a fancy Paris tweed to a broker on Fifth Avenue, who will gladly pay $125 to $150 for a suit which will not wear one-third as long as the $35 serge.

Unless you know your customers, you can't write advertising to reach them. Of course this means more time and more thought put on the advertising.

It means the dividing up of copy. If you are selling $25 suits of clothes for the working man, forget the banker, the professional man, and direct your copy to these particular customers. It flatters them, even though they do not buy the next day.

Selecting a Medium —

In choosing advertising mediums, dealers in some towns use moving pictures and street cars and derive splendid returns from their investments. Others spend all their money on street cars. One merchant in Milwaukee built his business from street cars, and still uses them for his show advertising.

Other merchants have used bill boards, and spent over half their appropriation. The thing to do is to study your own local market—know your merchandise, know your customers, and then plan to use the mediums that will get you the quickest results at the lowest possible cost. Sometimes you have to experiment for two or three years before you can finally pick out the one thing which delivers

the greatest net returns for the least amount of money invested.

In general, we find that the newspapers are the backbone of any advertising campaign. There are certain positions in a newspaper which are better for you and it is up to you to find out where these positions are. In a small town (under 5000 or even up to 25,000) your advertising pulls better if it is on the page which carries local news. I know one dealer who pays a premium of fifty per cent for a certain position on the local page for a period of eight years. He has proved conclusively the value of this space. After you have picked out the various mediums you expect to use, apportion a certain amount for one year. If it is $2000 stick to your $2000. If you expect to have special propositions, lay aside $200 for that purpose, but never exceed that amount. The mere fact that you have an arbitrary figure set the first of the year, makes you a better buyer of space, and more exacting in checking up your returns.

Not one merchant in 100 does this today, but more will do it in the next ten years. The national advertiser has been compelled to do this. Otherwise his advertising would have cut into his net profits to such an extent that his banker would question his ability to conduct the business.

Brevity in Advertising Copy —

After you have studied your medium, you are ready to prepare your copy. The psychologist has given us a great many things well worth considering in preparing copy. One of the first things is that an average person can read at a glance a line of three to seven words, containing not more than two syllables. Why go against this law of vision? Why string out a headline of 14, 15 or 16 words?

One thing to watch continuously is the way the newspapers handle their headlines in their big stories. Newspapers are compelled to tell the story of the world's events in headlines. Few people read the complete story. They read the headlines, and the subheadings, and pass on. Women will read from 150 to 200 words, while most men will not read more than 50 to 60.

Any of the big mail order houses offer splendid examples of terse, specific copy. Mail order houses depend upon pictures and words to sell merchandise.

Last year the largest house in this country sold more than $160,000,000 of merchandise that way. Get one of their catalogs, and study the lines of merchandise that are similar to yours. See how they describe it. Then plan your advertising along the same general lines. Specialty shops which are selling style, prestige, Paris importations, etc., do things in a different way, but the average merchant depends upon headlines, clean cut illustrations, and short copy to sell his offerings.

The next ten years are going to see a great change in retail store copy. Syndicate service and special writers on newspapers have done a great deal, but the retailers themselves are at last alive to the importance of good copy and they are devoting a certain amount of time to it themselves, employing special writers.

Working for Results —

Encourage your store employees to submit ideas for copy, and don't expect every advertisement to bring people in out of breath, money in their hands, anxious to get the merchandise you offered the day before. Advertising works slowly, but surely. It is planned and conceived in the idea of building up business.

Customers want news, but they want it told briefly and with an appreciation of their needs. Put more money into the brains preparing the copy, and your space will yield tremendous returns. It took the national advertisers a long time to learn this truth, but most of them now know it. Project yourself into your advertising. That is the kind of advertising people will read.

ESPERANTO AND THE ELECTRICAL INDUSTRY

(Translation from an article in "Esperanto" for October, 1919, p. 166.)

"The activity of our workers, which aims at the introduction of Esperanto in international commerce, already has produced satisfactory results. For nearly a year the World Salesman (Yokohama) has published an Esperanto section, and now, apparently as the result of that, we are informed that the Journal of Electricity (San Francisco) intends to devote four or five pages of its August number to our language. A few days ago the C. C. L. C. London received a very affable and interesting letter from Robert Sibley, the editor, together with a sample of the Journal. As an industrial or professional gazette it is a model of the best style of the printers' art; its hundred pages contain many beautifully drawn and striking advertisements of the most important firms in the United States; the technical notes and articles provide a true education to all those interested in electrical affairs.

"To all Esperantist electricians we cannot refrain from saying: 'Get it; borrow, steal or subscribe to it, but do not fail to possess it, especially when the Esperanto articles shall appear in it.' Electricians who desire further information may write to S. R. Marshall, Hon. Sec. C. C. L. C. (Cook's Office), Ludgate Circus, London, E. C. 4."

The above translation was made in Switzerland and transmitted to the Journal of Electricity by A. H. Babcock.

The original Esperanto version was published in the Journal of Electricity for August 15, simultaneously with the first article of the Esperanto series.

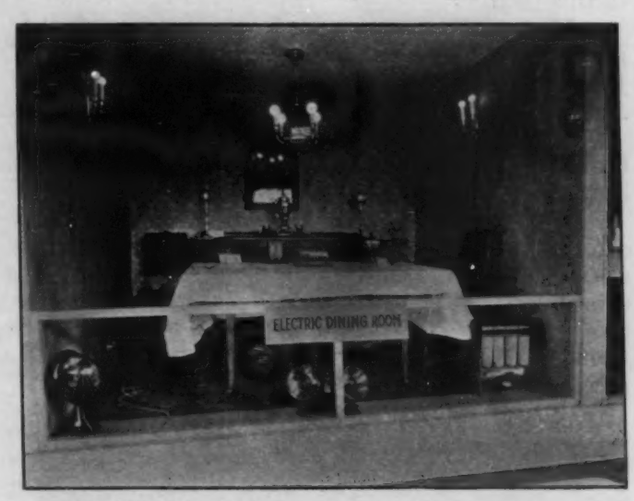
THE E. M. M. SERVICE

An unfortunate error found its way into our last issue where an account was given on page 510 of the Electric Motor Maintenance Service, the new double store of the Nutt Brothers at Lindsay, Cal. Instead of "Lindsay" the word "Willard" appeared, and the error was not detected until after the forms had gone to press. We offer our apologies.

Electricity at Utah State Fair

The fair and the parade are coming to be very widely used by electrical concerns for publicity purposes, and permit of extremely effective and convincing displays. The electrical home described below was a venture of this kind which aroused marked interest in electrical appliances.—The Editor.)

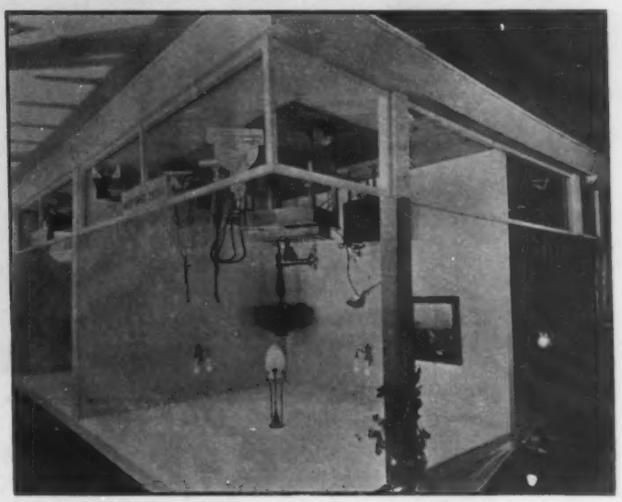
With the idea of bringing more forcibly to the minds of customers and prospective customers, the simplicity and convenience of various electrical devices, the Utah Power & Light Company's exhibit



A dining room equipped with electrical cooking apparatus for preparing a meal on the table. Different kinds of electric heaters are also shown.

was arranged to portray the interior of a five-room house, showing the various types of equipment which can be used to advantage in each room of the home. This was accomplished by building a raised platform in the center of the company's building and finishing the rooms to represent a kitchen, dressing room, dining room, sewing room and laundry.

It is interesting to note the vast change in the attitude of the public toward electric cooking. While a very few years ago an electric range was considered more or less of a novelty and experiment, it is not now necessary to explain to most people what an electric range will do, the main interest of the housewife being to find a range which will fit into her kitchen and meet her requirements as to appearance. The range, of course, was the principal point of interest in the kitchen, but the kitchen utility



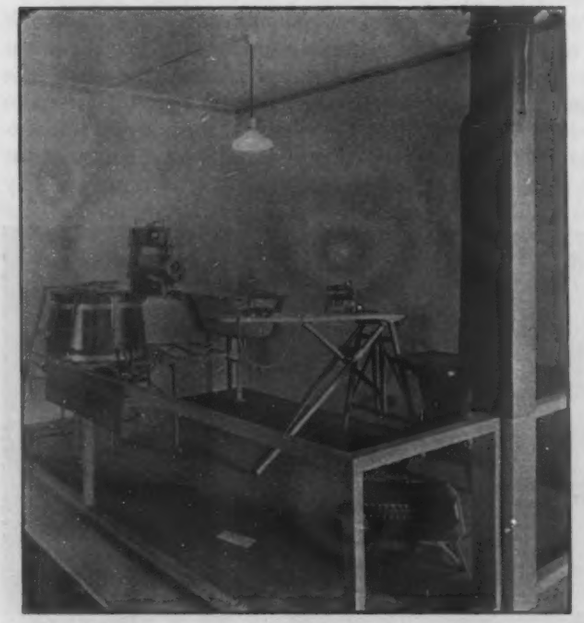
The electrically equipped sewing room. Demonstrations were given here of the electric portable sewing machine and the vacuum cleaner.

outfit, and various table appliances also attracted considerable attention.

In the dining room were shown the different kinds of table appliances which can be used for preparing a meal "on the table"; including a percolator urn set, chafing dish, waffle iron, toaster and grill stove.

The electric kitchen attracted a great deal of attention at the Utah State Fair. The cleanliness and efficiency of the electric range were brought home to many interested visitors, who also appreciated the smaller conveniences in the way of table appliances and a kitchen utility outfit.

The sewing room was of considerable interest because practical demonstrations were given showing the superiority of the electric portable type of machine. Vacuum cleaners were also demonstrated to advantage in this room.



The labor-saving laundry where washing, wringing and ironing are done electrically. An electric laundry stove and furnace regulator complete the equipment.

A good example of the effective electrical displays which are now a common sight at fairs is this attractive booth of Chaffee's Electric Shop, maintained at the recent Visalia Victory Fair. The sign is the same as that used over the store itself and the fact that it becomes familiar to all visitors to the fair is of great advantage to the store.

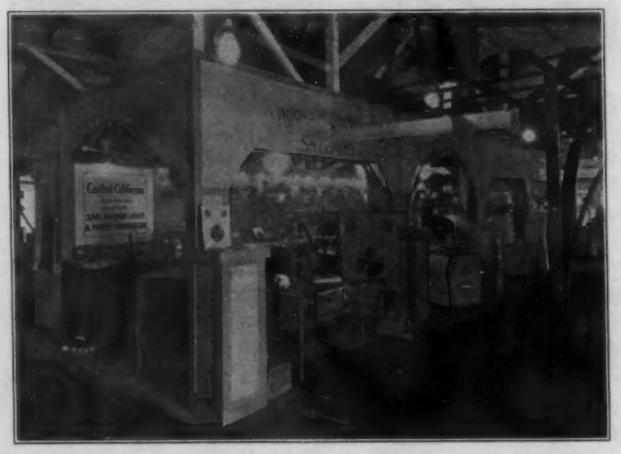
In the dressing room were displayed an electric curling iron and heater, boudoir iron, heating pad and boudoir lamp.

The laundry had a decided appeal to a large number of visitors, and salesmen were kept busy showing them how the unpleasant household tasks of washing and ironing can be accomplished electrically with very little effort in a short time. An electric washing machine, iron and board, laundry stove and electric furnace regulator were on display in this room.

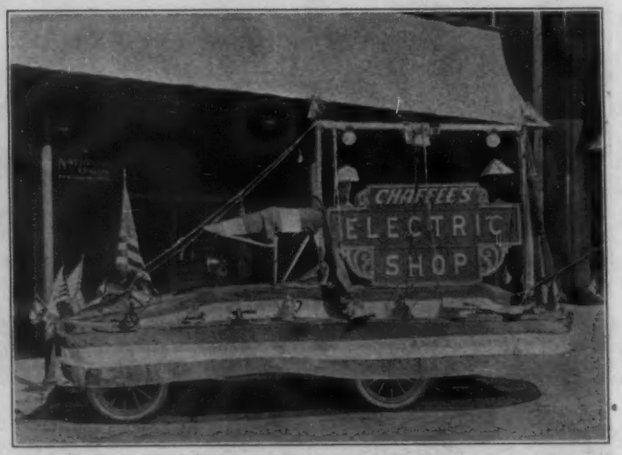
Electric heaters were placed in each of the rooms and proved their worth in a practical way, judging by the crowds of people who "camped" in front of them during the cool days.

A jazz band was on duty to assist in bringing the people in the general direction of the company's building and proved itself a good "magnet."

A special exhibit, in addition to the above, was set up showing the various practical ways in which electricity can be used on the farm for irrigating, domestic water pumping, feed grinding, etc., and a large number of very good prospects were secured from the farming districts served by the Utah Power & Light Company.



The booth of the Valley Electric Supply Company at the Fresno Fair. This extensive space was filled with a fine display of electrical household appliances of which washing machines were an important feature.



This float won a $50.00 cash prize in the Fourth of July parade at Visalia, California. It is notable that the same sign is used as appears in the booth shown on the left.

Publicity Through Motion Pictures

(A publicity medium which has not been utilized to anything like its fullest capacity in spite of the large audience it offers, is the motion picture. Following is an account of some of the ventures of electrical companies in the field, and the machinery available for this type of publicity.—The Editor.)

Educational motion pictures are recognized by all as being one of the best means of putting a story before the general public. One of the leading electrical manufacturers has already taken advantage

A film prepared by the Society for Electrical Development to advertise the electrical home

of this opportunity to visualize for the public the progress and wonderful achievements being made in the electrical industry.

Each picture tells a complete story. For instance, one picture depicts the evolution of American navigation from the Indian dug-out, the sail boat, the treadmill-driven ferry, Robert Fulton's steam-driven "Clermont," etc., to the latest achievement—the electrically propelled U. S. superdreadnaughts. New pictures are being produced continually, each telling a vivid story of modern science and invention, and yet having interlinked a scenic or human touch to make it of interest to the general public.

This manufacturer maintains a Film Department in San Francisco for circulating the films on the Pacific Coast. The films are loaned free, except for transportation charges, to anyone requesting them. The theatres receive notice of each new production, and the very large number of requests received from theatre managers signifies in no uncertain way that they and their patrons find the films extremely interesting. Educational institutions also are anxious to exhibit the films because of their high educational value.

In order that the men of the electrical industry may know when one of these educational electrical films is to be shown in their town or city, notices giving the name of the theatre and when the exhibition will take place are sent to the electrical dealers and contractors, the central station men, and to others who might be interested.

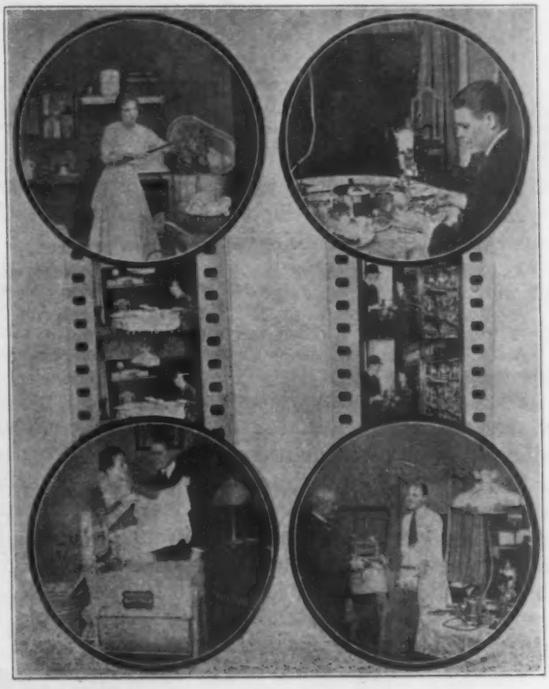
At present there are 9 different pictures in circulation on the Pacific Coast. In order to meet the large demand for those most recently produced, several extra copies are required; therefore in reality there are 21 films in circulation in this district. To date this year these films have been shown by 354 exhibitors 2000 times to approximately 367,000 people.

The popularity and demand for the films is steadily increasing with each new production, and there is no doubt but that these educational films

Announcements of educational films arranged by the General Electric Company

are playing an important part in promoting an interest in things electrical and making known to the general public the advantages of the use of electricity.

The statistics which have been given are of the work that is being done by but one of many electrical manufacturers. Adding to this the work



Scenes from moving pictures prepared by the Western Electric Company

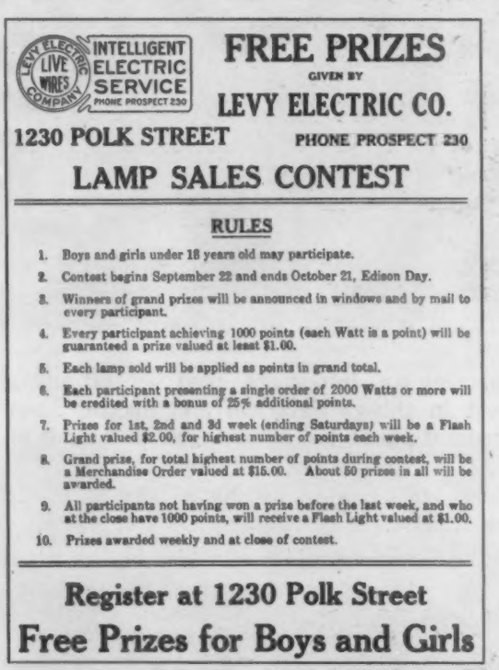
that the other manufacturers and a few of the jobbers are doing along the same lines, one can well say that motion pictures are playing an important part in stimulating business in electrical appliances.

Obviously the manufacturers employing motion pictures must be getting some direct or indirect returns from their expenditures. This, coupled together with the general value that such work is to the industry as a whole, commends it to the careful consideration of manufacturers that are not doing as much in this line, to say nothing of the consideration that should be given the matter by those who are doing absolutely nothing.

A Lamp Selling Contest

(Increasing sales, familiarizing the neighborhood with the name of the store, inducing a wider use of lamps, bringing in new customers—these and many other good results were obtained by the interesting plan described below. The idea is capable of various applications and may well be studied by the retailer.—The Editor.)

A successful piece of publicity work, recently carried out by the Levy Electric Company of San Francisco, was in the form of a lamp selling contest for boys and girls between the ages of 10 and 18 years. The contest lasted one month and the prizes offered were as follows:


LEVY ELECTRIC COMPANY
LIVE WIRES
INTELLIGENT ELECTRIC SERVICE
PHONE PROSPECT 230
FREE PRIZES
GIVEN BY
LEVY ELECTRIC CO.
1230 POLK STREET
PHONE PROSPECT 230
LAMP SALES CONTEST
RULES
1. Boys and girls under 18 years old may participate.
2. Contest begins September 22 and ends October 21, Edison Day.
3. Winners of grand prizes will be announced in windows and by mail to every participant.
4. Every participant achieving 1000 points (each Watt is a point) will be guaranteed a prize valued at least $1.00.
5. Each lamp sold will be applied as points in grand total.
6. Each participant presenting a single order of 2000 Watts or more will be credited with a bonus of 25% additional points.
7. Prizes for 1st, 2nd and 3d week (ending Saturdays) will be a Flash Light valued $2.00, for highest number of points each week.
8. Grand prize, for total highest number of points during contest, will be a Merchandise Order valued at $15.00. About 50 prizes in all will be awarded.
9. All participants not having won a prize before the last week, and who at the close have 1000 points, will receive a Flash Light valued at $1.00.
10. Prizes awarded weekly and at close of contest.
Register at 1230 Polk Street
Free Prizes for Boys and Girls

This leaflet, printed in black, on a bright orange ground, was distributed among school children to announce the contest, and brought in throngs of contestants.

A $2.00 flash light for the highest number of points (each watt being a point), for each of the first three weeks.

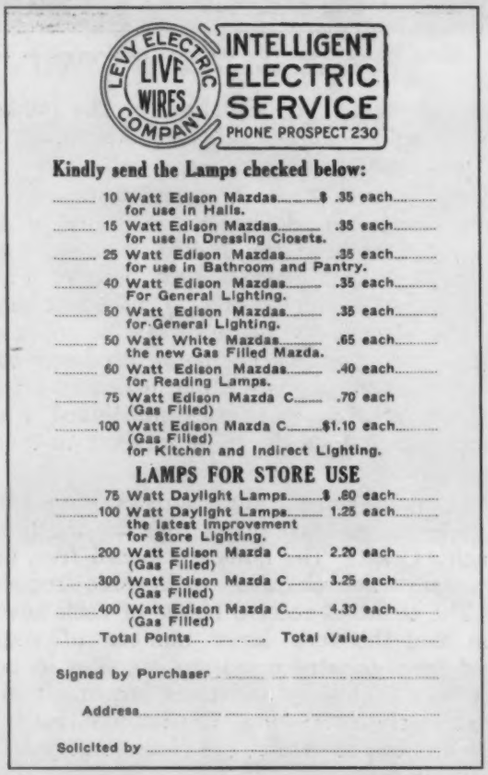
A $15.00 merchandise order as a Grand Prize for the highest number of points for the duration of the contest.

A $1.00 flash light to each contestant who achieved 1,000 points during the contest.

Besides that there were numerous other prizes, such as theater tickets for orders over a certain number of points, or for a certain number of orders during the week, etc. Each contestant presenting a single order of 2,000 watts or over was credited with a bonus of 25 per cent additional points. In the beginning of the contest it was thought advisable to stimulate registration and so 100 extra points were given to each contestant who would bring in another contestant for registration.

The special events and each week's results were announced in letters written to each contestant and sent to his home. A list showing the standing of contestants was put into the window each week.

Bright orange colored hand bills were printed announcing the contest and giving the rules. These were distributed among the pupils of three large schools in the neighborhood during a recess period. The result was a host of children wishing to register for the contest, and almost every contestant brought in at least one order from his mother if no other.


LEVY ELECTRIC COMPANY
LIVE WIRES
INTELLIGENT ELECTRIC SERVICE
PHONE PROSPECT 230
Kindly send the Lamps checked below:
10 Watt Edison Mazdas for use in Halls. $ .35 each
15 Watt Edison Mazdas for use in Dressing Closets. .35 each
25 Watt Edison Mazdas for use in Bathroom and Pantry. .35 each
40 Watt Edison Mazdas For General Lighting. .35 each
50 Watt Edison Mazdas for General Lighting. .35 each
50 Watt White Mazdas the new Gas Filled Mazda. .65 each
60 Watt Edison Mazdas for Reading Lamps. .40 each
75 Watt Edison Mazda C (Gas Filled) .70 each
100 Watt Edison Mazda C (Gas Filled) for Kitchen and Indirect Lighting. $1.10 each
LAMPS FOR STORE USE
75 Watt Daylight Lamps $ .80 each
100 Watt Daylight Lamps the latest improvement for Store Lighting. 1.25 each
200 Watt Edison Mazda C (Gas Filled) 2.20 each
300 Watt Edison Mazda C (Gas Filled) 3.25 each
400 Watt Edison Mazda C (Gas Filled) 4.30 each
Total Points Total Value
Signed by Purchaser
Address
Solicited by

Post cards listing the types and prices of lamps were supplied to contestants for the convenience of customers and competitors. The company's name and address is printed on the reverse side.

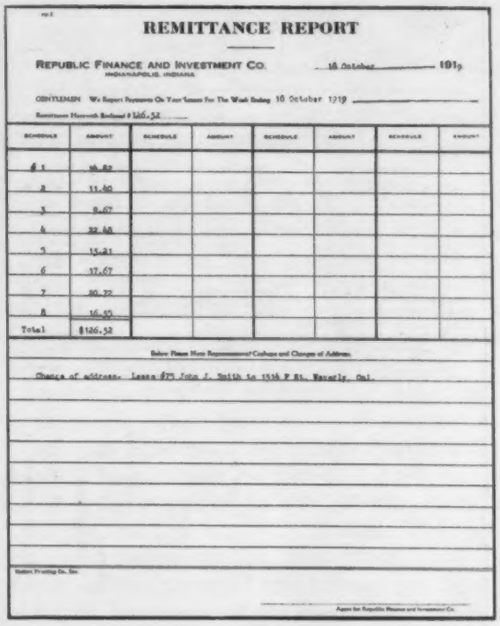
Copies were also printed, giving the prices of the different types of lamps and a space for the contestant's name and signature of the purchaser. These were in the form of a post card, and so could be mailed and the lamps delivered without the cards being brought into the store. Each contestant was given as many of these as he thought he could use when he registered, and came into the store at any time for additional cards when his supply was exhausted.

Financing A Retail Business

(The question of time payments, which most dealers now find to be an indispensable part of business, gives rise to various problems in financing. Below are described several schemes which are helping the dealer to solve these problems, and making time payments an asset instead of a risk.—The Editor.)

INDEPENDENT MERCHANTS FINANCING

The Republic Finance & Investment Company of Indianapolis, Ind., have an exceptional plan of financing electrical merchants selling electrical appliances on the instalment plan which enables the merchant to handle an unlimited amount of instalment business and at the same time establish himself as an independent and successful business merchant. Their plan confines their business relations to the merchants only and the merchant's customers know nothing of their financing transactions.



REMITTANCE REPORT

REPUBLIC FINANCE AND INVESTMENT CO. 18 October 191[illegible]
INDIANAPOLIS, INDIANA

GENTLEMEN We Report Payments On Your Leases For The Week Ending 18 October 1919

Remittance Herewith Enclosed $126.52

SCHEDULE	AMOUNT	SCHEDULE	AMOUNT	SCHEDULE	AMOUNT	SCHEDULE	AMOUNT
# 1	16.82						
2	11.40						
3	8.67						
4	22.48						
5	15.21						
6	17.67						
7	20.72						
8	16.35						
Total	$126.52						

Below Please Note Reinstatement Cashups and Changes of Address

Change of address. Lease #71 John F. Smith to 1514 P St. Beverly, Cal.

Weekly payment or remittance form of the Republic Finance and Investment Company. The merchant after getting his money to run his business pays it back as it comes in.

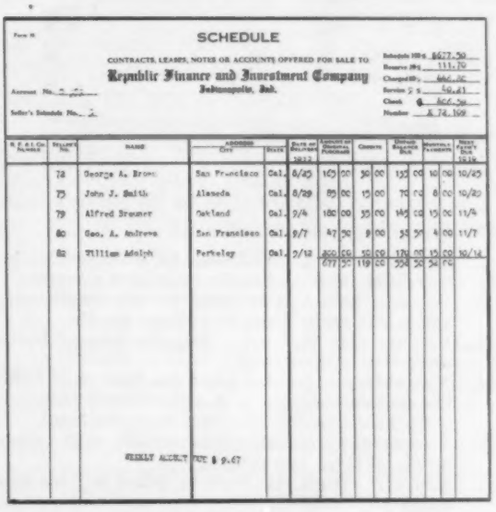
The Republic Finance & Investment Company made an agreement with the merchant to buy 80% of the accounts which he may list on their schedule forms. When making this agreement with him, they ask him to fill out a combined financial statement make an agreement with the merchant to buy 80% and an application for a fidelity bond, as they buy the accounts and immediately authorize him to act as their agent in making the collections, and for this purpose they bond him at a small expense to him (usually $15 to $25 per year), using the financial statement for this purpose.

Schedule forms are then furnished the merchant on which he lists such instalment leases or contracts as he may have on hand. Any number of leases from 3 to 40 can be listed on one schedule form, as the merchant sees fit to list them.

The company have made an agreement to buy 80% of the unpaid balance on any schedule that may be turned in and will turn over that amount less their service charge which varies according to the average length of time the schedule of leases have to run.

Accounts maturing by weekly or monthly payments within 7 months charge 7%; within 9 months charge 8%; within 11 months charge 9%; within 13 months charge 10%; within 15 months charge 11%.

In this particular case, 11 months, on which the charge is 9%, charged of course on the 80% only. In other words, 80% of $558.50 is bought by this company or $446.80. From this amount a service charge is deducted of $40.21, the merchant receiving $406.59. Therefore the merchant actually received immediately from instalment sales amounting to $677.50—cash at time of sales $119.00 and $406.59 on this plan, or a total of $525.59, and has a reserve of 20%, or $111.70, which he has coming in as an income for the 11 months time the schedule has to run, as he pays back to the Republic Finance & Investment Co. only 80% of the instalments that are due on this schedule or 80% of the $52.00 which amounts to $41.60. This company feels that a substantial business merchant will not dispose of all his instalment income and for this reason hold this reserve as they want him to have at least 20% of his instalment business as an income to carry his overhead during possible slow seasons, therefore they hold this reserve but allow him to keep the collections on it. This company has also found that it is much easier for the merchant to send in these amounts weekly instead of monthly and therefore they have a weekly payment or remittance form which simplifies all work connected with this part of the plan, as each schedule is numbered



SCHEDULE

CONTRACTS, LEASES, NOTES OR ACCOUNTS OFFERED FOR SALE TO
Republic Finance and Investment Company
Indianapolis, Ind.

Account No. [illegible]
Seller's Schedule No. 2

Schedule Total $677.50
Reserve 20% 111.70
Charged Off 446.80
Service 5% 40.21
Check $ 406.59
Number R 74 169

R. F. & I. Co. Number	Seller's No.	NAME	ADDRESS City	State	Date of Delivery 1919	Amount of Original Purchase	Cash	Unpaid Balance Due	Months to Maturity	Next Week's Due 1919
	72	George A. Brown	San Francisco	Cal.	8/25	165 00	30 00	135 00	10	10/25
	75	John J. Smith	Alameda	Cal.	8/29	85 00	15 00	70 00	8	10/20
	79	Alfred Brauer	Oakland	Cal.	9/4	180 00	35 00	145 00	15	11/4
	80	Geo. A. Andrews	San Francisco	Cal.	9/7	47 50	8 00	39 50	4	11/7
	82	William Adolph	Berkeley	Cal.	9/12	200 00	50 00	150 00	15	10/14
						677 50	119 00	554 50	56	

WEEKLY ALERT DUE $ 9.67

Schedule form of the Republic Finance & Investment Company showing a listing of five leases. By dividing the unpaid balance by the monthly instalments due one can ascertain the average length of time the leases on this schedule have to run.

and remittances are sent by one check covering any number of schedules. As shown, a check of $126.32 is sent but covers schedules 1 to 8 inclusive. Schedule No. 3 calls $9.67 payments per week which averages $41.60 per month or the 80% of the instalments on this schedule. The merchant after getting his money to run his business, pays it back as it comes in; on schedule No. 3 for instance he pays $9.67 per week until the 80% bought or $446.80 is paid.

As a matter of fact, many merchants using this plan are getting more for their merchandise than they would by selling for cash, for most merchants add a 10% carrying charge on the price of the merchandise they are selling, whereas they only pay the Republic Finance & Investment Co. on this plan a service charge averaging much less than 10% and this service charge is only on the 80% of the unpaid balance instead of the 10% the merchant charges on the selling price. The following table will make this clear:

Cash price of Washing Machine	$140.00	
On instalment plan	155.00	
		$155.00
Cash payment		20.00
Unpaid balance		135.00
80% bought by R. F. & I. Co.		108.00
Service charge 9% on $108.00		9.72
Net to merchant from R. F. & I. Co.		98.28
Merchant receives on sale		
Cash payment	$ 20.00	
From R. F. & I. Co.	98.28	
Immediate cash for merchant	118.28	
20% reserve received by merchant on instalment basis	27.00	
Total	145.28	
Cash sale price	140.00	
Additional profit	5.28	

The principal advantages to be gained from this plan of financing are as follows:

1. You establish a reputation as a successful business merchant, able to handle your own accounts.
2. You are able to pay cash for all merchandise and add a 2% cash discount to your profits.
3. You are able to develop your instalment business to unlimited proportions.
4. You obtain a greater price for your merchandise on the instalment plan and still receive sufficient cash with which to pay for cost and overhead.
5. You do not jeopardize your credit with outstanding notes, chattel mortgages, etc.
6. You can obtain the cash as often as you want and when you want it.

The Republic Finance & Investment Company, who have operated for years in the Middle West, have recently extended their operations to the Pacific Coast.

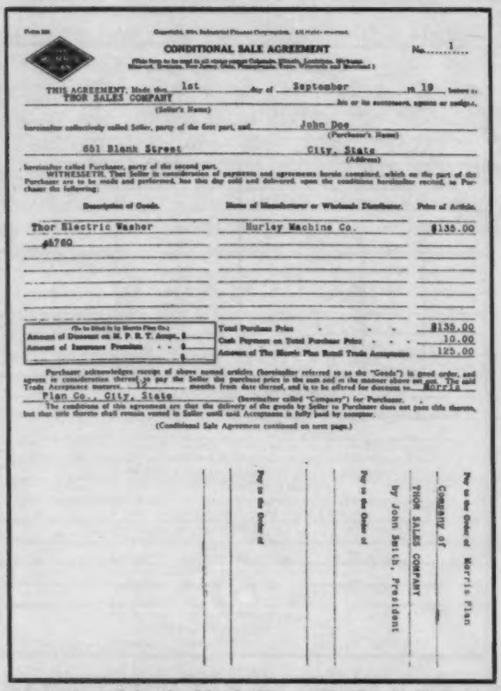
THE MORRIS PLAN

The Morris Plan system has 102 Morris Plan banks or companies located in populous centers throughout the United States. In handling the financing of deferred or time payment sales, Morris Plan banks use the mechanism of the Trade Acceptance instead of the promissory note.

The Trade Acceptance is adapted to this class of business for several reasons—one of which is its ready availability for rediscount. The substitution of trade acceptances in place of "accounts receivable" in a merchant's financial statement gives him invariably a better credit rating with his regular commercial bank.

These Retail Trade Acceptances, arising from time payment sales, are acquired by the Morris Plan bank—the proceeds going to the retail dealer, enabling him to finance his transactions with the jobber and manufacturer on a cash basis. They are then forwarded by the Morris Plan bank to its parent institution—the Industrial Finance Corporation—and are finally rediscounted with large banking and financial institutions.

The smooth operation of this machinery for financing and rediscounting requires that this paper



CONDITIONAL SALE AGREEMENT

No. 1

THIS AGREEMENT, Made this 1st day of September A. D. 19 between THOR SALES COMPANY (Seller's Name) hereinafter collectively called Seller, party of the first part, and John Doe (Purchaser's Name) 681 Blank Street City, State (Address) hereinafter called Purchaser, party of the second part,

WITNESSETH: That Seller in consideration of payments and agreements herein contained, which on the part of the Purchaser are to be made and performed, has this day sold and delivered, upon the conditions hereinafter recited, to Purchaser the following:

Description of Goods.	Name of Manufacturer or Wholesale Distributor.	Price of Article.
Thor Electric Washer #1760	Hurley Machine Co.	$135.00

Total Purchase Price	$135.00
Cash Payment on Total Purchase Price	10.00
Amount of The Morris Plan Retail Trade Acceptance	125.00

Amount of Discount on M. P. R. T. Accpt. $
Amount of Insurance Premium $
$

Purchaser acknowledges receipt of above named articles (hereinafter referred to as the "Goods") in good order, and agrees in consideration thereof to pay the Seller the purchase price in the sum and in the manner above set out. The said Trade Acceptance matures 1-2 months from date thereof, and is to be offered for discount to the Morris Plan Co., City, State (hereinafter called "Company") for Purchaser.

The conditions of this agreement are that the delivery of the goods by Seller to Purchaser does not pass title thereto, but that title thereto shall remain vested in Seller until said Acceptance is fully paid by purchaser.

(Conditional Sale Agreement continued on next page.)

Pay to the Order of

Pay to the Order of

THOR SALES COMPANY
by John Smith, President

COMPANY of

Pay to the Order of Morris Plan

Sales agreement used in the Morris Plan. The Retail Trade Acceptance on which the dealer's endorsement must appear, is on the reverse side of this form.

must first of all be absolutely safe—that it must originate from an actual sale of merchandise—and that the merchandise must be useful, of good quality, and sold at the right price.

The working mechanism of the Morris Plan is best described by giving a specific illustration. Let us suppose that through a manufacturer arrangements have been made for his retailers to sell his product (which we will assume is in this case an article of household utility) on time payments through the Morris Plan of retail trade acceptances.

First the manufacturer, after completing arrangements with the Industrial Finance Corporation, instructs his salesmen and representatives in all the details of the operation of the plan. Folders and other literature for the instruction of his retail dealers, also advertising for the public, are then prepared so that all factors in the transaction will understand it clearly.

The next step is for each dealer who desires to avail himself of the plan to get in touch with a Morris Plan bank or fiscal agency. By reference to the list of Morris Plan banks and fiscal agencies accompanying the pamphlet it will be seen that the

names of a number of the banks so listed are marked by a star, like this (*Birmingham). Morris Plan banks so marked are now prepared to handle Retail Trade Acceptances. The starred list will be increased from time to time as the remainder of the 102 banks are supplied with acceptance forms and methods.

A retail dealer who desires to use this plan should get in touch—personally or by correspondence—with the nearest Morris Plan bank that carries a star before its name. As the dealer's endorsement must appear on all Retail Trade Acceptances handled by the bank, and as the bank will look to him in case the customer finally fails to pay, the dealer is required to give to the bank a financial statement on which he is granted a certain line of credit, which means that he can turn over acceptances to the bank until he has reached the maximum established for him.

These details being settled and the contract signed, the dealer is furnished with all the necessary blanks and forms.

These forms are quite simple, consisting of a Morris Plan Retail Trade Acceptance and a Conditional Sale Agreement (or other lien on the article sold).

Both of these forms are printed on the same sheet and the customer is required to sign his name only twice.

A twelve months' time-payment sale on this plan would work out in this way: Assume that the article sells for $150 and the dealer requires 20 per cent down. In addition to the $30 cash payment, the customer is required to pay at the same time 6 per cent discount on the $120 Retail Trade Acceptance, which represents his obligation, and 1 per cent of the selling price of the article (or $1.50) as fire insurance for one year on the article purchased.

The dealer is required to pay a service fee of 2 per cent of the face value of the acceptance, or $2.40, for the actual service of the Morris Plan bank in handling the transaction.

The transaction works out in figures as follows:

Article selling for	$150.00
Down payment, 20%	30.00
Balance	$120.00
Trade Acceptance	120.00
Twelve months' time	
Customer pays $10.00 a month.	
Customer pays cash:	
Down payment	$30.00
6% Discount on $120.00 Trade Acceptance for 12 months	7.20
Insurance (1% of selling price)	1.50
Total cash paid by customer	38.70
Dealer receives:	
From customer (as above)	$38.70
From Morris Plan Bank the face value of Trade Acceptance ($120.00), less discount, $7.20; and insurance, $1.50; or $8.70	111.30
	$150.00
Dealer pays 2% of acceptance as service fee	2.40
Dealer receives net	147.60

From the above it will be noted that the dealer receives $147.60 for the article, which is $2.40 less than the cash selling price, the difference representing the bank's charge to the dealer for the service. Through this arrangement the dealer obtains cash for the sale of the article, and he steps out of the transaction at once except as he is contingently liable in case the customer fails to pay, and the ordinary collection proceedings instituted by the Morris plan are unavailing.

The dealer requires the customer to sign the Conditional Sale Agreement which is attached to the Trade Acceptance, and he draws the Trade Acceptance for $120 on his customer, and the customer accepts it by writing his name across its face.

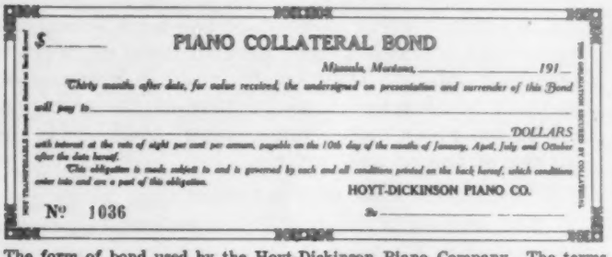
Thereupon the dealer endorses the Trade Acceptance and takes or sends it to the Morris Plan bank with which he deals. The Morris Plan bank sends a check for the face value of the Trade Acceptance to the dealer less discount, service fee and insurance as shown above.

On the same day the Morris Plan bank sends a letter to the customer giving the details of the transaction in order that the customer may check it up, and at the same time the bank encloses a coupon book which must be used in making payments at the bank. As the above transaction runs for twelve months, the payments will be $10 a month, and the days of the month on which payments are to be made are stated clearly in the coupon book.

The customer thereafter makes his payments at the Morris Plan bank — or through a special arrangement the payments may be received by the dealer and turned over to the Morris Plan bank.

A WORKABLE SCHEME

An interesting system of financing once used by the Hoyt-Dickinson Piano Company is as follows: The company got one of the members in a local bank to act as trustee, paying him a small wage of about $20.00 a year for his trouble, which was merely nominal. People were found who were willing to loan money with interest at 8% per annum, payable quarterly, and receive the company's special bond for the amount, which they took to the trustee. He signed it, stating that he held piano paper or notes as security for the benefit of the bond holders in an amount which exceeded the liability of the company on the bonds by 33 1/3%. These notes were to be kept 85% unmatured by the company. In other words if the customer did not make the payment which his note called for, the company had to pay it to the trustee anyhow, with an allowance of 15%. All payments on the notes received by the company were turned in to the trustee once a month, and he used this money to pay the interest and the bonds as fast as the money came in, the company reserving the right to pay off the bonds at any time before the thirty months had expired.



$_____ PIANO COLLATERAL BOND

Missoula, Montana, _____ 191__

Thirty months after date, for value received, the undersigned on presentation and surrender of this Bond will pay to _____

_____ DOLLARS

with interest at the rate of eight per cent per annum, payable on the 10th day of the months of January, April, July and October after the date hereof.

This obligation is made subject to and is governed by each and all conditions printed on the back hereof, which conditions enter into and are a part of this obligation.

HOYT-DICKINSON PIANO CO.

No 1036 By _____

The form of bond used by the Hoyt-Dickinson Piano Company. The terms of the contract are printed on the inside, and the trustee's certificate on the back.

Electrical Instruction in a High School

BY A. L. JORDAN

(The high degree of specialization required in the scientific world is causing more and more emphasis to be laid upon technical education in the high schools. The provision which is made for this in the way of courses of instruction and laboratory equipment in a San Francisco school is described here by the head of the electrical engineering department of the San Francisco Polytechnic High School.—The Editor.)

The Polytechnic is one of the five public day high schools of San Francisco. In 1913 the Board of Education, through the Superintendent's office, reorganized the courses of study, and the one outlined here is one of the many offered to the young men and women of the city.

In this school the subject of "General Science"

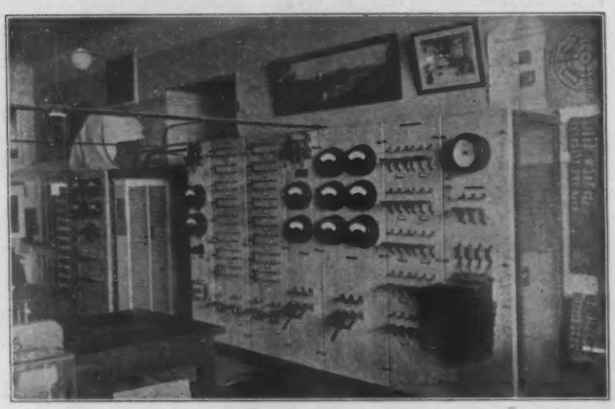


Fig. 1. Main switchboard in the electrical laboratory of the San Francisco Polytechnic High School

is given to the first year students, and at the opening of the second year a separation of the students into two groups is made. One group, called the "College Preparatory," is offered the regular preparation in Science given in most of the high schools of the state; the other is given greater freedom in electing which subjects they are to study in preparation for their life work. A description of the electrical instruction given these "non-college" students is the purpose of the present article.

Plan of the Course

The courses in Electricity are preceded by a one-year course in Elementary Physics, taken during the second year, which includes laboratory experimentation, and which covers the elements of electricity. It should be understood also that an Electric Shop course (in the Mechanical Arts Department) is open to the students, where construction rather than experimental work and testing is the main purpose.

The third year course is entitled "Direct Current Electricity" and, beginning with the simpler experiments on magnetism, annunciator circuits, fall of potential, etc., it passes on to work with voltmeters, ammeters, galvanometers, the Wheatstone bridge, rheostats, wattmeters, watt-hour meters, storage cells, etc. Tests are made of the principal kinds of direct current motors and dynamos; for example, the current-voltage characteristic of shunt, flat-compounded and over-compounded dynamos, the no-load characteristic, speed-load characteristics of shunt and series motors, also current-torque curves of these two motors. Some experiments are made on the magnetic qualities of iron, on electric heating, insulation resistance, line losses, the three-wire system of distribution, watts per candle power of lamps, elements of armature winding and Prony brake tests of motors. One new experiment is that with an electromagnetic transmission dynamometer built by the Diehl Company of Elizabeth, N. J.

Experimental Work

The course in alternating currents, which occupies the fourth year, involves only elementary mathematics, and consequently does not attempt electrical machine design; but the students have had algebra, geometry and a little trigonometry and can make the necessary calculations. The experiments include

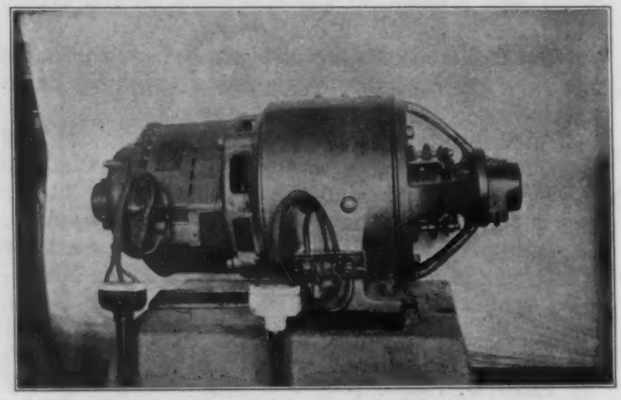


Fig. 2. Hawthorne motor generator set, 10 hp., used to furnish direct current for general purposes.

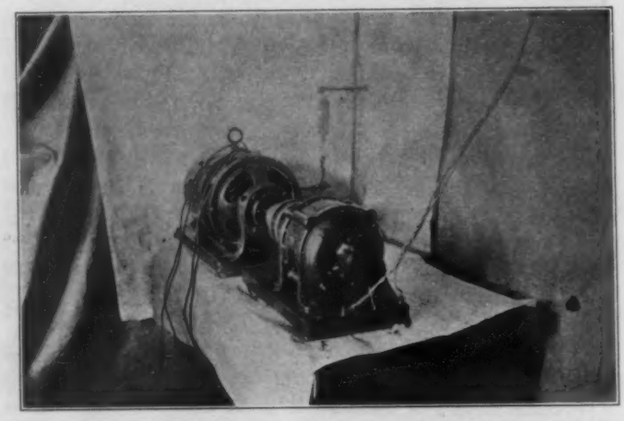


Fig. 3. Transmission dynamometer test of a small two-phase induction motor.

simple tests of transformers (ratio and voltage tests), the measurement of inductance, study of fuses and circuit-breakers, measurement of capacity, the single-phase a.c. dynamo, power-factor, frequency, two-phase current, the rotating field, two-phase motors, voltage relations of two-phase circuits, starting compensators, synchronous motors, various kinds of single-phase motors, transformer

tests, calibration of ammeters and voltmeters, tests of a belted and a direct-connected motor-generator set, also a rotary converter, study of watt-hour meters, plotting hysteresis loop curves of iron, a variable

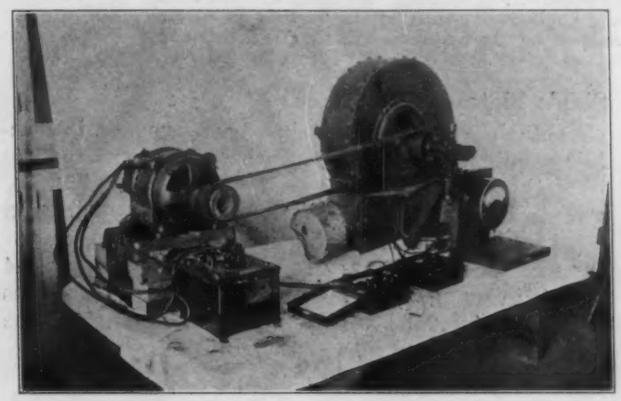


Fig. 4. Set-up for testing a variable speed wound rotor 2-phase motor. The rheostat is shown, also the instruments for getting the apparent power and the real power, and the blower used for loading.

speed two-phase motor, and the Scott transformation from two to three-phase current.

Both of the courses mentioned include recitations, lecture-table experiments and sets of numerical problems. Visits are made to power stations and other centers of interest.

Laboratory Equipment

Fig. 1 gives a view of the main switchboard which furnishes direct current, single-phase and two-phase alternating current to other parts of the building as well as to the smaller switchboard seen in the background of the picture, and to various terminals in the room. A Hawthorne motor-generator set (10-hp.) is used to furnish direct current for general purposes; it has the valuable feature of an external resistance strip whose value may be altered, thus changing the amount of compounding. This gives opportunity for an experiment where the students get readings of voltage and current for various loads and plot the corresponding characteristic curves. Fig. 3 shows the transmission dynamometer test of a small two-phase induction motor (foreground). In the background is seen the dynamometer with a spring balance attached to a rod projecting a measured distance from the field frame. When the armature is generating a current it exerts a torque upon the field, which is mounted on pivots. The field, therefore, can be kept "floating," and from the balance reading the "arm" of the balance and the revolutions per minute, the horsepower of the driving motor can be calculated. This is the system used by some of the largest automobile manufacturers in the testing of their motors and is a step in advance of the electrical method (measuring output of a dynamo), which in turn is better than the old Prony brake method. Fig. 4 illustrates a set-up for testing a variable speed wound rotor (G-E "MQ") 2-phase motor. In the picture can be seen the rheostat, and the instruments for getting the apparent power and the real power, also the blower used for loading. The power-factor is then obtained by dividing the real power (wattmeter) by the product of the voltmeter and ammeter readings.

Among other apparatus is a motor-generator set (Ft. Wayne type) which is used for several purposes. One machine can be supplied with direct current and the field of the other from the same source; then the latter delivers alternating current at various frequencies. By getting the input of the motor (d.c. instruments) and the output of the generator (wattmeter) the overall efficiency can be calculated. In another experiment with this set, characteristic

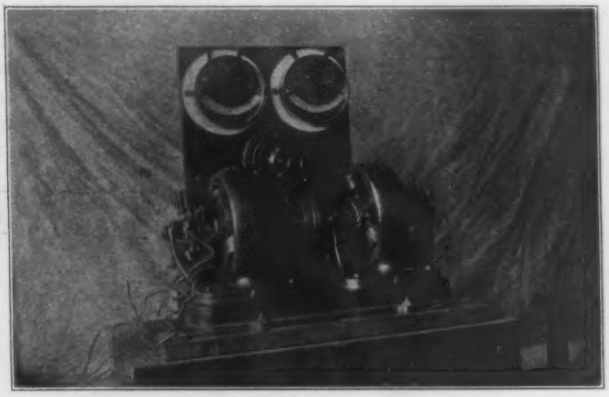


Fig. 5. A Ft. Wayne type motor generator set in which the alternator can be used as a synchronous motor and the d.c. machine be driven as a generator.

curves of the alternator are plotted. In still another, the alternator is used as a synchronous motor and the d.c. machine is driven as a generator.

Qualifications of Students

These experiments will give an idea of the kind of work done, and it will be seen that it is of the same nature as that given in a "Junior College," except that the calculations are mostly arithmetical. There is no pretense made that the young men who have completed this course are "electrical engineers," but it should be evident that they should be able to do intelligent buying, some installation, and a considerable amount of operating of the commonly used electrical machines. Besides this, they are able to read the literature of the electrical profession, so that by means of books and particularly the electrical journals, they are able to advance themselves in that profession.

VOCATIONAL EDUCATION

An address on vocational education for the business of exporting, made before the foreign trade convention, included the following statement:

The most important factor in the creation, life, and success of foreign trade is the cooperation of the employers in business houses with the teachers. Granted that these schools must teach those things that will make the student valuable to the business house, conversely the business house must give preference to the graduates of such training when they are hiring men. The closest cooperation must be maintained between the business house and the teaching.

The business house, therefore, must cooperate, in the first place, with the high school. The essential point is that if the business house signifies its intention to employ a number of junior clerks every year—conditions being normal—it shall pick out at the end of the junior year likely commercial high-school pupils who have taken the commercial course up to that point, and shall give them places as messengers, or at small desks, during the summer. The high-school pupil, therefore, when he goes back to his school, will go back with his interest awakened by having been in contact with actualities.

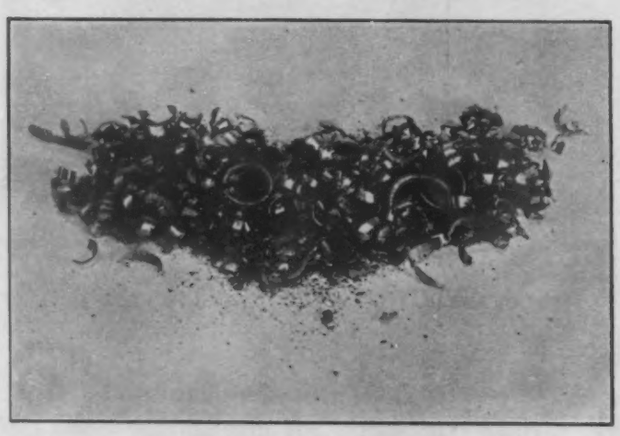
Arc Welding

BY F. A. ANDERSON

(Arc welding, though a comparatively recent development, is coming to hold an important place, especially in shipping work. The following analysis of some of the factors in electric welding is the first of a pair of articles on the subject by the inspector for the U. S. Shipping Board in San Francisco.—The Editor.)

THE RELATION BETWEEN ELECTRODES AND PARENT METAL

In the minds of many people the term "welding" means only the process employed by the blacksmith who heats his metal in an ordinary forge until the proposed abutting surfaces have reached the desired heat, when by a process of hammering and working he brings the parts together into a homogeneous union. However, those thoroughly conversant with the art recognize without reservation that the many processes of autogeneous welding produce most satisfactory results.



Turnings from welded material showing ductility and uniformity of the metal after it has passed through the arc.

Electric Arc Welding —

Electric arc welding is one of the autogeneous processes, and while it originated about twenty years ago, it has not been universally practiced until within the last few years. It is susceptible to the faults of all welding; it is capable of accomplishing most every desired operation and has proven its ability to be used in difficult places where other processes cannot be conveniently employed.

Welding Faults —

So-called "burned metal" is common to all welding, and the blacksmith at his forge must use care to avoid it; the gas-welder must give careful attention to his flame and guard against the same fault, while the electric "arc welder" must adjust his current and hold his arc, in order that he may not meet with the same failure.

Shrinkage cracks are another fault usually produced by too great a heat, and care must be exercised to avoid them in every process.

Insufficient heat is also a fault, and results in the two metals failing to form a proper union.

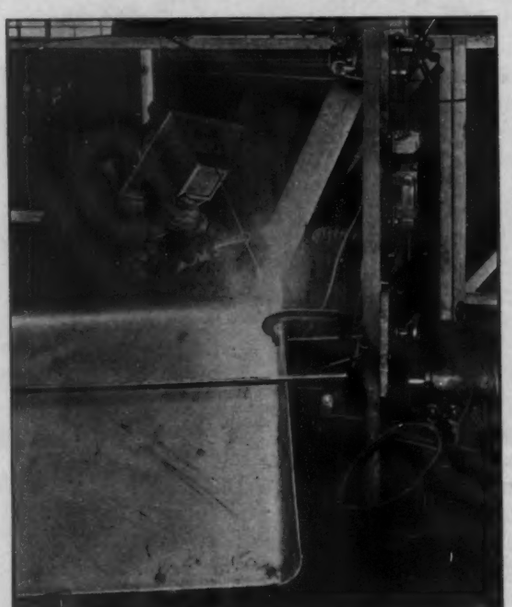
This article will deal more particularly with the electric welding of ferrous metals and as the particular kind of this metal usually welded is what is generally known as "steel" in its various grades, this type of metal will first be considered.

Ship's Plate —

Much recent interest has been aroused in electric welding in connection with ship's construction; it is therefore well to consider the composition of the steel plate used in ships. These plates range in tensile strength from 58,000 to 72,000 lbs. per square inch. They vary in carbon content from .14 to .28; in manganese from .30 to .46; in phosphorus from .027 to .043; while sulphur is found in some as high as .05 and silicon to about .05.

Mild Steel Electrodes —

What are known as mild steel electrodes are obtainable on the market, manufactured by various companies and these vary widely in their chemical composition—carbon from .08 to .25; manganese from .25 to 1.00; phosphorus from .025 to .06; sulphur from .024 to .06; silicon from .016 to .08. The Welding Committee of the Emergency Fleet Corporation, which has lately merged into the American Welding Society, proposed a specification for a mild steel electrode of the following chemical composition:



Welding a dipper pan—a piece of very light work in steel. The skill of the operator in adjusting his instrument has much to do with the homogeneous character of the weld.

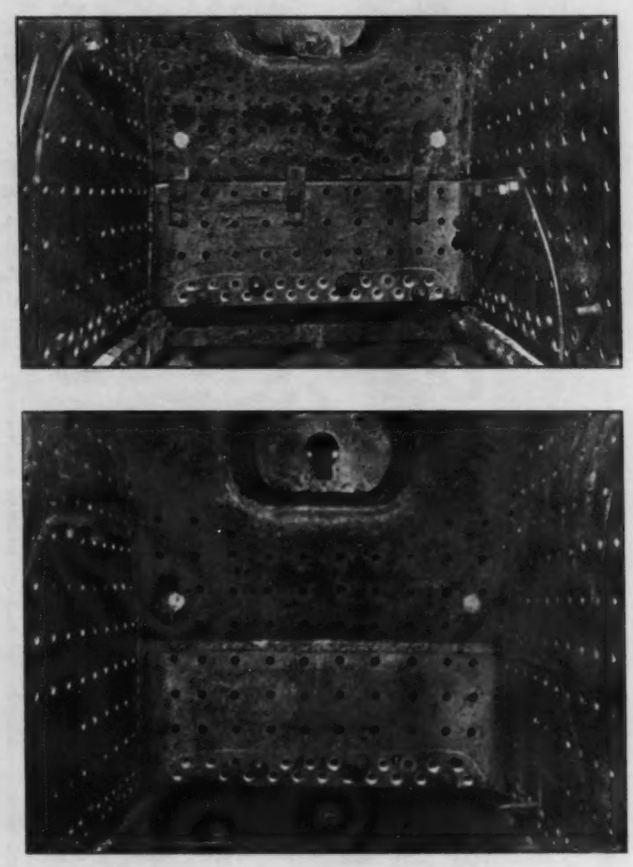
Carbon	Not	over	0.18%
Manganese	"	"	0.55%
Phosphorus	"	"	0.05%
Sulphur	"	"	0.05%
Silicon	"	"	0.08%

Effects of Copper and Aluminum —

Some manufacturers have added to the composition of their electrodes a content of copper, while others include a small amount of aluminum; both these ingredients tend to cleanse steel and add some-

what to its ductility and toughness. Both are valuable properties and if a combination with these ingredients can be obtained in a manner permitting them to be carried through the arc and re-established in a proper co-related order in the welded material their value will be increased.

Copper is included in the original composition of some electrodes, while in others it is used as a



An example of the welding of large plates in ship work. The upper picture shows the work cleaned and ready for welding and the lower shows the completed job.

coating. Aluminum is used as a cleansing agent in the original metal for some electrodes, but is usually absorbed in this service and does not seem to re-appear in sufficient quantity to be detected by chemical analysis. Another method of using aluminum is to wrap an aluminum wire of proper size around the electrode, which includes it in the welding operation. Here again it seems only to perform its cleansing power and fails to re-appear in the chemical analysis of the welded material.

There is another type of electrode included in this class and used for general ferrous metal work. It is what is known as the "pure iron" electrode. Its carbon content is low, varying from .01 to .05, with manganese from .02 to .18; phosphorus, .005 to .04; sulphur, .007 to .025 and silicon, .005 to .08. This type of electrode is very popular among many users and I recall one installation where arc welding has been an accepted practice for a number of years. Here they have adopted such an electrode and make their standard size 5/32" adjusting all stations (of which at the time they had about 30) to give the best universal result in volts and amperes and maintaining this adjustment without change, although their work ranged from very small to very large pieces and from small to large sectional areas.

Welded Material Analysis —

The following chemical analysis may be of interest in showing some instances of results obtained in arc welding. The first table shows analysis of electrodes in their original state and the second table the analysis of the welded material.

ANALYSIS OF ELECTRODES

Designation	Carbon	Mang.	Phos.	Sul.	Sil.
1	0.16	0.56	0.032	0.024	0.016
2	0.13-0.17	0.50	0.012	0.045	0.011
3	0.01	0.025	0.005	0.025	0.005
4	0.16	0.56	0.032	0.024	0.016

ANALYSIS AFTER PASSING THROUGH ARC

Designation	Carbon	Mang.	Phos.	Sul.	Sil.
1	0.05	0.18	0.031	0.036	0.011
2	0.14	0.14	0.012	0.039	0.011
3	0.25	0.23	0.0018	0.075	Trace
4	0.27	0.22	0.0018	0.076	Trace

In the foregoing tables items one and two are taken from a report by Captain Caldwell of the British Navy, while items three and four are from tests conducted under the author's directions. As the carbon content in the "analysis after passing through arc" of specimens three and four was questioned, a second sample was sent to the chemist who verified the result.

On pieces 3 and 4 the deposited metal formed a homogeneous mass and united with the parent metal, a cross section through the piece showed no line of demarcation between the parent metal and that which had passed through the arc except by the use of a magnifying glass, the two metals then showing a very similar structure.

The Manufacture of Metals —

In the manufacture of metal the material containing the desired ingredients is first cast into "pigs" or "billets." From these "pigs" the metal is re-cast, worked or wrought into its finished product and by this process, gaining much of its physical properties.

Again bringing this metal to a molten state reduces it, when properly cooled, to a condition closely akin to that of its billet formation. It loses some of its physical properties and will not be as high in tensile strength, ductility or elasticity, as it was in the wrought state. It is to conserve the greatest per cent of these properties that research and experiments have been made. In these experiments arc welding has given excellent results.

Sample of ferrous work in the welding of a ship's rudder. Arc welding is coming to play an important part in the shipbuilding industry.

THE ELECTRIC FURNACE IN OPERATION

(The consistent success of the electric furnace in the heating of metals is attested by constant reports from all over the country. One of the recent interesting installations in the Northwest is described below.—The Editor.)

A new installation at the Lamb Machine Company's plant, Hoquiam, Washington, consists of the newest design of rolling cylinder type of Greene Arc Furnace.

The furnace is supported in the usual way on rails on which it rolls over for the purpose of pouring the charge. The tilting of the furnace is accomplished by two hydraulic cylinders attached to the

Rolling cylinder type furnace in use

end of the furnace shell and operated by a four-way valve. The tilting of the rolling cylinder type Greene Arc Furnace is an important operating feature. The furnace is especially easy and quick to operate in either pouring or in cutting off the metal stream when the ladle is filled. It is provided with a special attachment to the spout whereby the shank ladles are supported for filling without the use of more than one man, who operates the furnace tilting valve. The spout is especially designed to take this attachment and the ladles may be filled without any spilling of metal. The charging door of the furnace is opposite the spout. This is raised or lowered by means of a double acting hydraulic cylinder, the operating valve of which is arranged conveniently for the furnace operator. The door is designed so that it practically seals itself and thus keeps air out of the furnace. The roof is constructed of only standard shaped bricks with the exception of one special shape which makes the electrode holes.

This furnace is provided with two electrodes through the roof, and has a bottom electrode underneath each top electrode so that each phase operates independently. The power is furnished to the electrodes at 110 volts on each arc, and the electrical equipment consists of two Packard electric furnace transformers of 250 kva. each taking current at 2300 volts, 3-phase, and supplying 110 volts, 2-phase. These transformers are specially designed with the reactance within the transformer case and their operation has been highly satisfactory.

The meter panel is located in the wall of the transformer room and contains the ammeters which serve for the controlling of the current in each electrode circuit. The panel also contains a graphic curve drawing watt meter, which serves to regulate the maximum demand of the furnace. The other regular standard instruments are provided on the panel, including volt meter, clock, watt hour meter and overload relays. The operating lever for the high tension oil switch is located immediately beneath this panel and in convenient reach of the furnace operator.

This furnace is not provided with automatic control motors, but is so designed that these may be installed at any time. Automatic control motors have recently been installed on a Green Arc Furnace at the Pacific Car & Foundry Company's plant at Renton, Washington, and are operating with special satisfaction.

A German Spy

—fleeing from justice, is said to have jumped into his office files. He has never been found since.————

ARE YOUR FILES IN THIS CONDITION?

There is one problem which every business has in common—the caring for current information so that it may readily be utilized when needed. Recognizing the importance of proper filing systems to all branches of the electrical industry, from the contractor-dealer to the power company, the Journal of Electricity has arranged with **Miss Irene Warren,** director of the Chicago School of Filing and Indexing, to present the subject of

OFFICE RECORDS — THEIR FILING AND INDEXING

in a series of twelve articles, beginning with the issue of January first. The comprehensive helpfulness of these articles, which cover every general and special problem which will arise in your office routine, may be judged from the subjects planned:

1. **The Central Filing System and the Department files.**
2. **Equipment and Supplies—What to buy and where to buy it.**
3. **The Alphabetic Name File.**
4. **Alphabetic Systems Coded—What they are and how to use them.**
5. **Geographic Arrangement.**
6. **Numeric Filing.**
7. **Subject Filing—the decimal arrangement.**
8. **The use of the files — How to charge material and regulations for users.**
9. **Card Records.**
10. **The Transfer, Follow-up Systems.**
11. **Problems of Supervision and Administration.**
12. **The Filing of Special Records.**

Beginning Next Issue

SEE TO IT THAT YOUR FILES ARE A PLACE FOR OBTAINING INFORMATION —NOT LOSING IT

The New Physics

BY A. C. CREHORE

(The characteristics of atomic structure as it affects fundamental equations are here discussed. The author indicates a reciprocal relationship between velocity and the dimensions of specific inductive capacity. This is the third of a series of articles which present an entirely new basis for physics. Dr. Crehore is well known as a pioneer and authority in this field.—The Editor.)

It will be attempted in this section to give the reasons that have led to the belief that the dimensions of specific inductive capacity are the reciprocal of a velocity. Certain preliminary conceptions must, however, first be mentioned that may, perhaps, seem to lead us far astray from the point we are intending to discuss.

The first theory of atomic structure which had a definite form is that due to Sir J. J. Thomson, proposed at a time not long after his discovery of the existence of the electron. He postulated that each atom consisted of a sphere of positive electrification of fairly large dimensions, comparatively speaking, within which a number of electrons each having the same charge of negative electricity were circulating in orbits. His reason for assuming this positive sphere of electrification was undoubtedly for the purpose of retaining the negative electrons in a united system; for, it is supposed that negative electrons repel each other, and some means of counteracting this repulsion was required. This arrangement secured equilibrium for the circulating electrons.

At a subsequent time Sir Ernest Rutherford showed by means of his experiments on the scattering of the so-called alpha particles by matter that it is most probable that the positive charge of an atom cannot occupy the very large dimensions that Thomson assumed that it had, and that the dimensions are required to be very small indeed, even smaller than the dimensions of a single electron, and yet it was also thought that almost the whole of the mass of the atom resides in this very small positive nucleus as it is now called. Rutherford was supported in this view by the current form of electromagnetic theory as applied to either the atomic nucleus or to an electron. How this may be again requires a digression from the main topic before us, but it is very essential to understand what it is that electromagnetic theory has to say about this matter.

Properties of the Electron

Several forms of electron have been proposed by different investigators, but the so-called "solid electron" due to Lorentz has received the most attention, and partly for the reason that it is more amenable to mathematical treatment than the other forms. At rest this electron has a spherical shape with a definite radius and the electrical charge is distributed throughout the whole volume of it. Each element of this charge is supposed to repel every other element, and the effect of them all together is to produce a very great pressure at the surface of the sphere tending to expand the volume of it. It is further supposed that this great pressure is counterbalanced exactly by a sort of hydrostatic pressure exerted over the entire surface of the sphere. The mathematical treatment of the case by means of electromagnetic theory is not very simple and we shall have to limit ourselves here to the mere statement of some of the conclusions deduced from this form of electron.

It has been found, first, that the mass of the electron is not fixed and constant, but that it changes in value according to its velocity of translational motion. Moreover, that it differs from all other bodies that have ever been known before in that its mass is different when considered in the direction of its motion, the longitudinal mass, than it is when considered in a direction perpendicular to its motion, the transverse mass. However, the expressions for these masses as dependent upon the velocity show that there is very little change in the mass before its velocity is very great indeed, something like the tenth part of the velocity of light. For all values of its velocity less than this the longitudinal mass and the transverse mass have the same values approximately, namely

$$m = \frac{4}{5}\frac{e^2}{c^2 a},$$

where m is the mass, a the radius of the sphere, e the electrical charge of it, and c the velocity of light. The importance of this formula can scarcely be emphasized enough. Among other things it has led to the belief that specific inductive capacity has the dimensions of the reciprocal of a velocity, which is the topic immediately before us.

Nucleus of the Atom

Let us first see how this formula bears out the idea of Rutherford alluded to above. It is well known that the mass of the hydrogen atom, the lightest of all kinds of atoms, is very large by comparison with the mass of one electron, about 1846 times as great. If there is only a very small number of electrons in the hydrogen atom, as there is supposed to be on very good evidence, then it is obvious that practically the whole mass of the hydrogen atom must be concentrated in its positive nucleus, for there is nothing else in the atom. In a neutral hydrogen atom the charge of the positive nucleus is equal to the sum of the charges of the electrons in it, hence, the e of the above formula must be very nearly the same for the electron as it is for the nucleus. But the mass of the nucleus is very much greater as shown, and hence it must be that the radius of the nucleus, which is inversely as the mass, is very much smaller than that of the electron. All this, of course, is on the supposition that the whole of the mass of the atom is purely of an electrical origin as represented by this formula. This idea is substantiated the more we find out about all of these matters.

Now this result justified Rutherford in supposing that the nucleus of an atom is very small indeed, smaller than that of the electron itself, and this was borne out by his experiment on the scattering of the alpha particles. It discredited the older Thomson theory which had the electrons immersed within the large sphere of positive electrification, thus making it many times larger in volume than the sphere of the negative electron. The Thomson atomic theory has accordingly been abandoned and the Rutherford theory taken its place. But with the abandonment of the Thomson theory went out also the benefit that it conferred of providing the means of securing stability for the electrons in orbits. Rutherford had no means of providing stability for the electrons in his new form of atom, but in spite of this his ideas have prevailed because they are supported by such strong evidence. There was the hope at least that something would appear to relieve the difficulty, even if electromagnetic theory as it then existed did not offer any solution of the problem.

Remarks on Electromagnetic Theory

It was known at the time that Rutherford proposed his theory that electromagnetic theory had already proved to be deficient in other directions. In particular Max Planck had made his startling proposal that the flow of energy probably takes place in what he called quanta, that is to say in multiples of a fixed minimum of energy, and this implied that energy partakes of a quasi atomic nature. This proposal was originally made on the strength of the known experimental facts connected with the radiation of energy by matter. Electromagnetic theory had proved itself incapable of giving results in agreement with observation in this instance, and Planck did not hesitate to lay it aside. It is not proposed to enter into any discussion of these matters here more than to say that the ideas of Planck were receiving confirmation with a rapidity that probably exceeded his expectations as time went on, and they have now taken rank with other established physical facts irrespective of any difficulty in understanding them by means of electromagnetic theory.

But, to discredit electromagnetic theory at one point and still retain it at another is what we have really been obliged to do. This may seem to be a very questionable procedure at first thought to some, but it is not disconcerting when we take the proper view of the situation. Electromagnetic theory is still in the process of development as it has been since the beginning made by Maxwell. The original Maxwell equations account for most of the phenomena usually dealt with in the textbooks on Electricity and Magnetism as well as the more recent modifications of this theory, but they are not so general as the recent modifications of this theory, and do not account for certain other phenomena which the modern equations do account for. Here we have a precisely analogous case where the equations are useful for certain phenomena and are not to be trusted for other phenomena. In this instance the reasons why they are not to be trusted are quite apparent to us because we possess the better and more general forms of equations. Similarly, it is easily seen that other phenomena might arise for which the best equations we now possess lead to error, and it may be expected that the reason for this will appear some time when still more general forms of equations are found. It would be ridiculous to throw away the best equations we now have, which already include a larger variety of phenomena than the earlier ones did, simply because cases have arisen that lie outside of the domain of the equations we possess. Hence it is necessary to learn to diagnose each case as it arises, and to decide whether the present equations are applicable to the case or not. This unsatisfactory state of affairs gives considerable latitude to the investigator, and the use of the word diagnosis is very apt, for to diagnose the case is precisely what the investigator at the present time is obliged to do in much the same sense as the physician makes his diagnosis by the symptoms presented.

Analysis of Mass Formulæ

In the present instance our diagnosis is that the Lorentz mass formula above given is correct, and applies to the case justifying the Rutherford form of atom, as showing that the nucleus of the atom is very small. Let us write down this equation once more as applied to the nucleus of the hydrogen atom. Denoting by e the electrical charge of a single electron, and assuming that there are two such electrons in every normal hydrogen atom in accordance with the author's theory, the charge of the hydrogen nucleus is equal to 2e being positive. The Lorentz formula then becomes

$$m_H = \frac{4}{5}\frac{(2e)^2}{c^2 a_H} = \frac{16}{5}\frac{e^2}{c^2 a_H},$$

the subscripts H referring to hydrogen. e and c are the same for hydrogen or any other atom, but m and a are different and require the subscripts. This formula may also be written interchanging the positions of m and a as follows:

$$a_H = \frac{16}{5}\frac{e^2}{c^2 m_H}.$$

The numerical values of the quantities on the right of this equation are all known, and the numerical value of the radius may, therefore, be found. But, in this equation a good example is presented of the usefulness of dimensional formulæ, and both members of the equation should be examined to see that the dimensions are the same. Evidently the dimension of the left member on any system is simply a length, L. The dimensions of e^2 on the electrostatic system were derived above, and they may be taken from Table I, namely, $e^2 = L^3 M T^{-2} k$, also those of $1/c^2 m_H$ are $L^{-2} M^{-1} T^2$. Multiplying these together gives the dimensions of the right hand member of the equation as Lk, and not simply L as in the left member. The equation as it stands is, therefore, according to this sure test not a true equation between physical quantities according to any system of units. To make the dimensions of it agree we must multiply the left member by k or divide the right member by k as we prefer. This cannot of course affect the numerical value, since the numerical value of k is unity on the electrostatic system of

units, but it is most important to express the k, and not leave it to be understood that it is supposed to be there. It is the common practice among writers on electromagnetic theory to suppress the k as being unity and not affecting any numerical values on this account. Its omission, however, naturally leads one to the belief that the writers who suppress it suppose that it is dimensionless as well in terms of length and time. If our units of length, the centimeter, and of time, the second, are changed it will be shown presently that k is no longer equal to unity, and it becomes most important to include it in writing any formula. The revised equation including the k now becomes

$$a_H k = \frac{16}{5\,m_H}\left(\frac{e}{c}\right)^2.$$

The dimensions of each member are now L k on the electrostatic system of units. If, however, we give k the dimensions L^{-1} T, so as to transfer over to the new space-time system of units, the dimensions of each member become simply a time T, the L's cancelling out.

Relation Between Constants

This suggests that we make a search for some constant quantity that has the dimensions of time simply, and compare this with the value of the time given in the above equation. The first constant that naturally comes to mind is the time of one revolution of the electrons in the normal hydrogen atom. According to the author's theory of the atom explained in a later section the frequency of revolution is equal to twice the well-known Rydberg constant, which may be denoted by 2K, K being the Rydberg constant, numerically equal to 3.290×10^{15}, and 2K being 6.580×10^{15} revolutions per second. Therefore, the time of one revolution is 1/2K, which has the dimension of time simply, the dimension of the Rydberg constant being the reciprocal of a time.

Without the numeric 16/5 in the above equation, it is found that the reciprocal of twice the Rydberg constant is numerically closely equal to the literal part of it, and we obtain a new relation between physical constants,

$$2K = m_H\left(\frac{c}{e}\right)^2.$$

Both the dimensions of this and the numerical values agree. This enables us at once to write down a value for e^2/m_H, which may for the present be considered as the unknown part of the equation, as follows,

$$e^2/m_H = c^2/2K.$$

The numerical values of the velocity of light, c, and the Rydberg constant, K, as obtained from observations on spectra, are known with exceptional accuracy. The velocity of light is very close to the number 3×10^{10} centimeters per second, and the Rydberg constant very close to the number above given, 3.290×10^{15}. Using these numbers we obtain a numerical value for e^2/m_H,

$$e^2/m_H = 1.36778 \times 10^7.$$

The decimal places are retained on the assumption that these are the exact values of c and K, and the result may easily be corrected for the very slight departure of c from 3 and of K from 329.

By substituting the value of 2K just given in the value of $a_H k$ previously given, we also obtain another important relation

$$a_H k = \frac{8}{5K},$$

thus connecting the radius of the hydrogen nucleus directly with the Rydberg constant, both members of this equation representing a time.

Having obtained a numerical value for the ratio of e^2 to m_H, each quantity might be found separately if there were any other experimental relation known between these two quantities. Fortunately there exists such another relation, in which the constants are known with accuracy. This is the constant obtained from the electrochemical equivalent of an element in electrolysis, and the constant may be referred to as the Faraday constant. The relation is

$$\frac{e}{c}\,\frac{A_H}{m_H} = 9649.4,$$

where A_H denotes the atomic weight of hydrogen referred to oxygen as 16. Taking the ratio between the values of e^2/m_H above given and the e/m_H obtained from this, after putting $A_H = 1.008$, and $c = 3 \times 10^{10}$, we obtain a numerical value for e, namely

$$e = 4.763 \times 10^{-10} \text{ electrostatic units},$$

and using this numerical value of e, we get a numerical value for m_H, namely

$$m_H = 1.658 \times 10^{-24} \text{ grams}.$$

It is considered that these numerical values for both e and m_H are within the limits of error in the direct experimental measurement of these important constants. The best value of e obtained by Millikan by the use of his oil-drop method is 4.774×10^{-10}, and his value for m_H is 1.662×10^{-24}. By giving more attention to the best known values of c, K, and A_H the numerical values here given may be modified very slightly, but it is considered that these theoretical values of these constants will be the most reliable when these small corrections are properly attended to.

There is another experimental constant also known with considerable accuracy, from which a numerical value of the mass of the electron itself may be obtained. This is the ratio of e to cm_o, namely

$$e/cm_o = 1.767 \times 10^7,$$

as determined by Bucherer, where m_o signifies the mass of the electron at slow velocities. By the use of this and the previous value of e we find

$$m_o = 0.898 \times 10^{-27} \text{ grams}.$$

Technical Hints

BY LOUIS ETSHOKIN

(The commutator being one of the most frequent causes of trouble in direct current machinery, the following exposition of the principle of operation of the device will be of practical aid in the solution of operating difficulties connected with it. The author is electrical engineer with the Halcun Radio Company of San Francisco.—The Editor.)

PRINCIPLES OF COMMUTATION

As the most troublesome part of a D. C. machine is the commutator, a thorough understanding of commutator principles is essential. Let us take

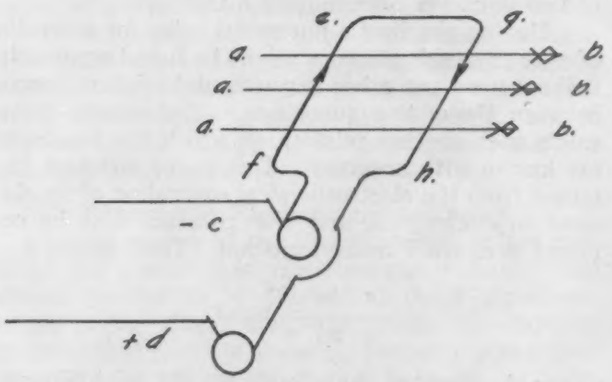


Fig. A.

Fig. A represents an elementary generator with one loop cutting the maximum number of lines of force, and the maximum voltage being induced in the direction shown.

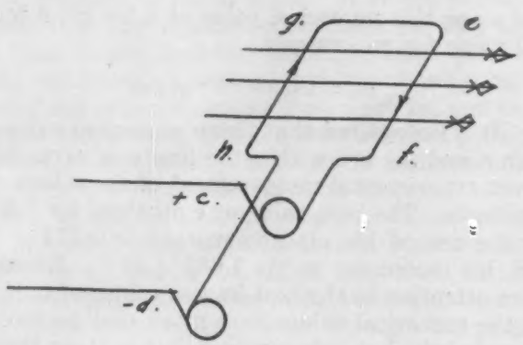


Fig. B.

When the loop has turned through an angle of 180° "c" has become the positive brush and "d" the negative, as in Fig. B.

first the case of Fig. A. Here we see an elementary generator with one loop and each end of the loop attached to a slip ring. Assume we have two poles with the lines of force in the direction 'ab.' Let the direction of rotation be clock wise. Right now the loop is cutting the maximum number of lines of force, and the maximum voltage is being induced in the direction shown. The brush 'd' is a positive brush, current going out; and the brush 'c' is a negative brush, current going in.

Now let us take the case of this loop at right angles to the lines of force, 90° later. Here no lines of force are being cut, and consequently no voltage is generated.

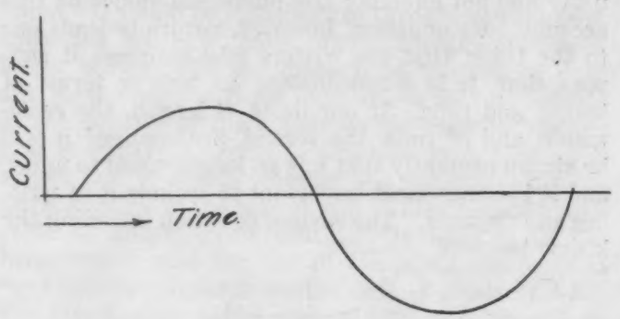


Fig C.

Diagram representing alternating current as produced in Figs. A and B, with "c" positive one-half of the time and "d" positive the other.

Let us go 90° more to Fig. B. Here 'c' has become the positive brush, and 'd' is now the negative brush. In other words, we are producing alternating current, for, half the time 'c' is positive and half the time 'd' is positive. Fig. C represents a picture of the current.

Now the question is, how are we to make direct or uni-directional current out of this? What we want is direct current on the line. We don't care

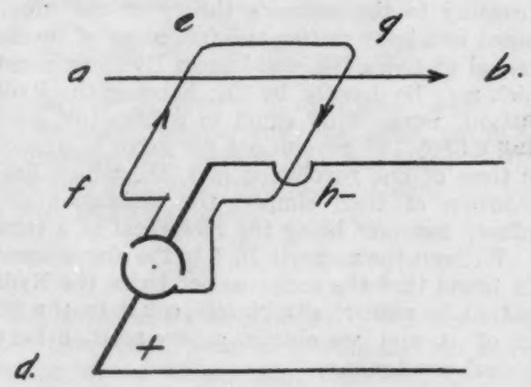


Fig. D.

Here the ends of the loop are connected to two segments of a single ring, each segment insulated from the other.

what happens inside the machine. Here is a way we could do this. Say we want brush 'c' negative and brush 'd' positive all the time.

If we could change brushes just at the time 'd' begins to get negative and change back again when 'd' is positive we could accomplish what we are after. This is exactly what a commutator does.

Let us look at Fig. D. Our loop is now connected to two segments of a single ring, each segment insulated from the other, and the brushes are placed, so that when the loop is not cutting any lines of force they will touch both segments. The

loop is in the same position as at Fig. A. Now let us see the loop at the position of Fig. B (Fig. E) and note if 'd' still remains positive and 'c' negative. (It might be said here that in a current-producing device, the terminal out of which current flows is positive and the terminal into which it flows is negative.) We see that 'd' is still positive and 'c' is still negative. The alternating current has been commutated. What has been done is this: As soon as the current started to change in the loop, the brushes switched over to new ends of the coil. Consequently though the current changed direction in the loop, the current in the outside circuit did not. This is then the principle of commutation. Now our current loops as in Fig. F. The device which does the trick is the commutator, and brushes. The segments of the commutator must be insulated from each other and the brushes must change segments when the current is zero.

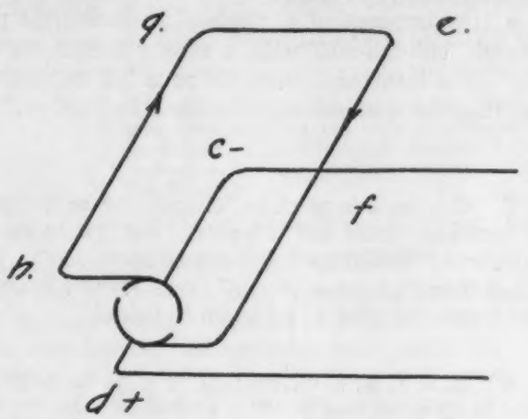


Fig. E.

The brushes are placed in such a way that when the loop is in the position of Fig. B, as here, "d" is still positive and "c" negative, so that direct current is being produced.

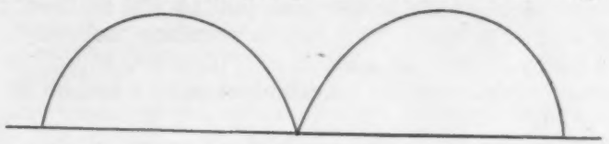


Fig. F.

Diagram of the current after the commutator has caused it to change direction in the loop, thus producing continuous current in one direction.

Essentials of Esperanto

BY W. R. DAINGERFIELD

(Judging from correspondence received in connection with our announced plan to devote a certain space to Esperanto, the electrical industry is taking a marked interest in this world commercial language. The first instalment of an Esperanto grammar is here presented in parallel columns. Judge W. R. Daingerfield, the author, is one of Esperanto's most able exponents.—The Editor.)

GRAMATIKO DE ESPERANTO

1. Ne estas esceptij nek neregulaĵoj en la Lingvo Internacia.

2. La difina artikolo "the" (thi) estas **la**. Ne estas nedifina artikolo.

3. Adjektivoj finiĝas per **a**; derivitaj adverboj per **e**; infinitivoj per **i**; substantivoj per **o**; ordonaĵoj per **u**.

4. La simple-sonaj vokaloj estas tiuj de la germana, itala kaj hispana lingvoj; **a** kiel en "father"; **e** estas mezasone inter la **e** de "met" kaj la **a** de "mate", sed sen la soneto de **y** malforte aŭdebla en "day"; **i** kiel en "machine" (maŝin), simila al **ee** en "see" (si); **o** kiel en "hot," ne estante la **o** in "note," kiu skribiĝus "noŭt" en Esperanto; **u** kiel **oo** en "food."

5. La akcento ĉiam estas sur la antaŭlasta silibo, kompreneble kun escepto de la unusilibaj vortoj.

6. Sonas **j** kiel la angla **y**. La pluraloj finiĝas per **j**. La diftongoj, **aj, ej, oj, uj, aŭditaj** en "aisle" (ajl), "day, toy, chop suey" (ĉop suj, hina bongustaĵo, simila al kuirita salato), estas kunmetaĵoj unusonaj kaj unusilabigaj de unu simpla vokalo kun la **y**. Simile la supersigneta **ŭ** kunmetiĝas kun **a** por formi **aŭ**, aŭdata en la anglaj vortoj "how, now"; kaj kun **e** por formi **eŭ**, kiu ne ekzistas en la angla, sed estas aŭdebla en la esperanta vorto "Eŭropo." La supersig-

ESPERANTO GRAMMAR

1. There are no exceptions or irregularities in the International Language.

2. The definite article "the" is **la**. There is no indefinite article.

3. Adjectives end in **a**; derived adverbs, in **e**; infinitives, in **i**; nouns, in **o**; imperatives, in **u**.

4. The simple vowels are those of the German, Italian and Spanish languages: **a** as in "father"; **e** is about half-way between **e** in "met" and **a** in "mate," but without the **y** sound faintly heard in "day"; **i** as in "machine" (like **ee** in "see"); **o** as in "hot" (not the **o** of "note," which would be written "noŭt" in Esperanto); **u** like **oo** in "food."

5. The accent is always on the next to the last syllable, except, of course, in monosyllables.

6. **J** sounds like the English **y**. Plurals end in **j**. The diphthongs **aj, ej, oj, uj**, heard in "aisle, day, toy, chop suey," are combinations into one sound and syllable of the simple vowel and the **y**. Similarly the marked **ŭ** combines with **a** to form **aŭ**, heard in the English words "how, now"; and with **e** to form **eŭ**, which does not exist in English, but is heard in the Esperanto word "Eŭropo" (Europe). The mark over the **ŭ** shows that it is not a syllable, but that it

neto super la ŭ montras, ke ĝi ne estas silabo, sed kunfandiĝas kun la antaŭstaranta vokalo, formante unu solan sonon kaj silabon nomitan diftongo. Ekzemple la vorto "laŭ" (along with, according to) ritmas similsone al "now, how, cow" (kaŭ, bovino), sed "balau," havante nenian markon sur la **u** (ordonmodaĵo de "balai," tu sŭip) estas elparolata "bah-lah-oo," kun forta akcento sur la "lah." La enmetitaj literoj **h** ne estas parolataj, sed montras nur, ke la sono de la **a** estu tiel, kiel en la vorto "father" (patro).

7. **C** estas **ts**; **ĉ** kiel **ch** en "church"; **g** kiel en "go"; **ĝ** kiel aŭdebla en "gem, jail"; **h** kiel en "hot"; **ĥ** kiel en la skota "loch" aŭ la germana "ach, ich"; **j** kiel **y**; **ĵ** kiel **zh**, aŭdebla en "pleasure, azure"; **s** ĉiam siblas, neniam zumas kiel la **z**; **ŝ** kiel **sh** en "shall."

8. **B, d, f, k, l, m, n, p, t, v, z** kiel en la angla. Ne estas **q, w, x** nek **y**. Oni trilas la **r**.

9. Verboj estantecaj finiĝas per **-as**; estintecaj per **-is**; estontecaj per **-os**. La kondiĉmodaj, signifantaj, ke la verba ago estas nur supozata, aŭ estas kondiĉigata depende de io alia, finiĝas per **-us**.

10. Participoj: Estanteca aktiva **-ant-**; estinteca **-int-**; estonteca **-ont-**. Estanteca pasiva **-at-**; estinteca **-it-**; estonteca **-ot-**.

11. Prepozicioj regas la nominativan kazon.

12. La akuzativa aŭ objektiva kazo de substantivoj, pronomoj kaj adjektivoj finiĝas per **n**. Kiam la tuta senco de verbo ne estas sciebla, sen tio, ke oni sciu la estulon aŭ estaĵon ricevantan aŭ suferantan la agon de la verbo, tiam la ricevanto-suferanto prenas finiĝon **n**, kaj tian verbon oni nomas transitiva. La vorto montranta la diritan aĵon aŭ ulon respondas la demandon, Kiun? aŭ Kion? kun la verbo antaŭstariĝinta antaŭ tiu ĉi demandvorto, jene: "Mi amas lin." (Vi amas kiun? Respondo: Lin.) La "lin" do estas ricevanto de la ago am', kaj devas preni **-n** en Esperanto.

13. Dua rimedo por trovi la akuzativaĵon aŭ objekton aŭ komplementon de transitiva verbo,—jen tri samsencaĵoj,—kaj samtempe trovi, ĉu la ekzamenata verbo estas ja transitiva aŭ ne, estas vidi, ĉu la frazo koncerna estus renversebla kun la vorto "by" (**baj**, de) metita antaŭ la subjekton, kaj ĉu la supozata akuzativaĵo estus tiam uzebla, kiel subjekto, jene: Li estas amata de mi.

14. Se la verbo tian ricevanton ne havas, oni nomas ĝin netransitiva; kiel, Ŝi dormas; la hundo bojas; la suno leviĝas.

15. Estas detalaĵoj, kiuj povas modifi tion, kio estas dirata kaj dirota per tiuj ĉi alineoj, tamen la studanto nun ne bezonas rilati ilin.

16. La akuzativa **-n** estas ankaŭ utiligebla por montri direkton al io, en okazo se ago komenciĝas ekster io kaj finiĝas en aŭ sur aŭ apud ĝi, aŭ almenaŭ moviĝas en ĝia direkto; ekzemple, "La birdo flugas en la ĉambron," sed la frazo "La birdo flugas en la ĉambro," montras, ke la birdo plenumas la tutan flugadon interne de la ĉambro. "La hirundo flugis trans la riveron, ĉar trans la rivero estas aliaj hirundoj."

coalesces into the preceding vowel, forming one sound and syllable called a diphthong. Thus, the word "laŭ" (along with, according to) rhymes with "now, how, cow"; but "balau," with no mark over the **u** (the imperative of "balai," to sweep) is pronounced "bah-**lah**-oo," with a strong accent on the "lah." The inserted **h**'s are not sounded, but merely show that the **a** sound must be like **a** in "father."

7. **C** is **ts**; **ĉ** is as **ch** in "church"; **g** as in "go"; **ĝ** as heard in "gem, jail"; **h** as in "hot"; **ĥ** as in the Scotch word "loch," or the German "ach, ich"; **ĵ** as **zh**, heard in "pleasure, azure"; **s** is always hissing, never humming, like **z**; **ŝ** like **sh** in "shall."

8. **B, d, f, k, l, m, n, p, t, v, z**, as in English. There is no **q, w, z** or **y**. **R** is trilled.

9. Verbs in the present tense all end in **-as**; past tense, **-is**; future tense,**-os**. Conditional mode (signifying that the verbal act is merely supposed or is conditioned on something else), **-us**.

10. Participles: Present active, **-ant-**; past, **-int-**; future, **-ont-**; present passive,**-at-**; past, **-it-**; future, **-ot-**.

11. Prepositions govern the nominative case.

12. The accusative or objective case of nouns, pronouns and adjectives ends in **n**. When the full sense of a verb is not complete unless the person or thing that receives or suffers the action of the verb is known, the recipient takes **n**, and such a verb is called transitive. The word indicating the recipient answers the question Whom? Which? or What? preceded by the verb. Thus: "I love him." (Love whom? Answer: Love him.) "Him" is the recipient of the act "love," and takes **-n** in Esperanto, thus: "Mi amas lin."

13. Another way to determine the accusative or object or complement of a transitive verb—three names of the same thing—and at the same time determine whether the verb under scrutiny is transitive, is to see whether the sentence may be turned around with the word "by" in front of the subject, and whether the supposed accusative may then be used as a subject, thus: He is loved by me.

14. Where the verb has no such recipient it is called intransitive; as, She sleeps; the dog barks; the sun rises.

15. There are details that may qualify what is said and is to be said in these paragraphs, but the student is not concerned with them now.

16. The accusative **-n** is also used to show "direction towards," where some act begins outside of something, and finishes in or on or near it, or at least moves in its direction; thus, "The bird flies into the room" is "La birdo flugas en la ĉambron"; but "The bird flies in the room," that is, does all its flying while in the room, would be "La birdo flugas en la ĉambro." "The swallow flew across the river because across the river are other swallows" would be, "La hirundo flugis trans la riveron, ĉar trans la rivero estas aliaj hirundoj."

BETTER SERVICE TO THE PUBLIC

California Electrical Co-operative Campaign

An Educational Campaign in Which the Various Electrical Interests Co-operate to Improve the Industry's Service to the People

(The plans of the Cooperative Campaign with regard to an electrical page in the newspapers have been working out very satisfactorily, and in some cases four consecutive electrical pages, amounting to an Electrical Section, have appeared. Advertising matter is also being sent out to dealers and the advisory committee is putting in a good deal of time on publicity plans.—The Editor.)

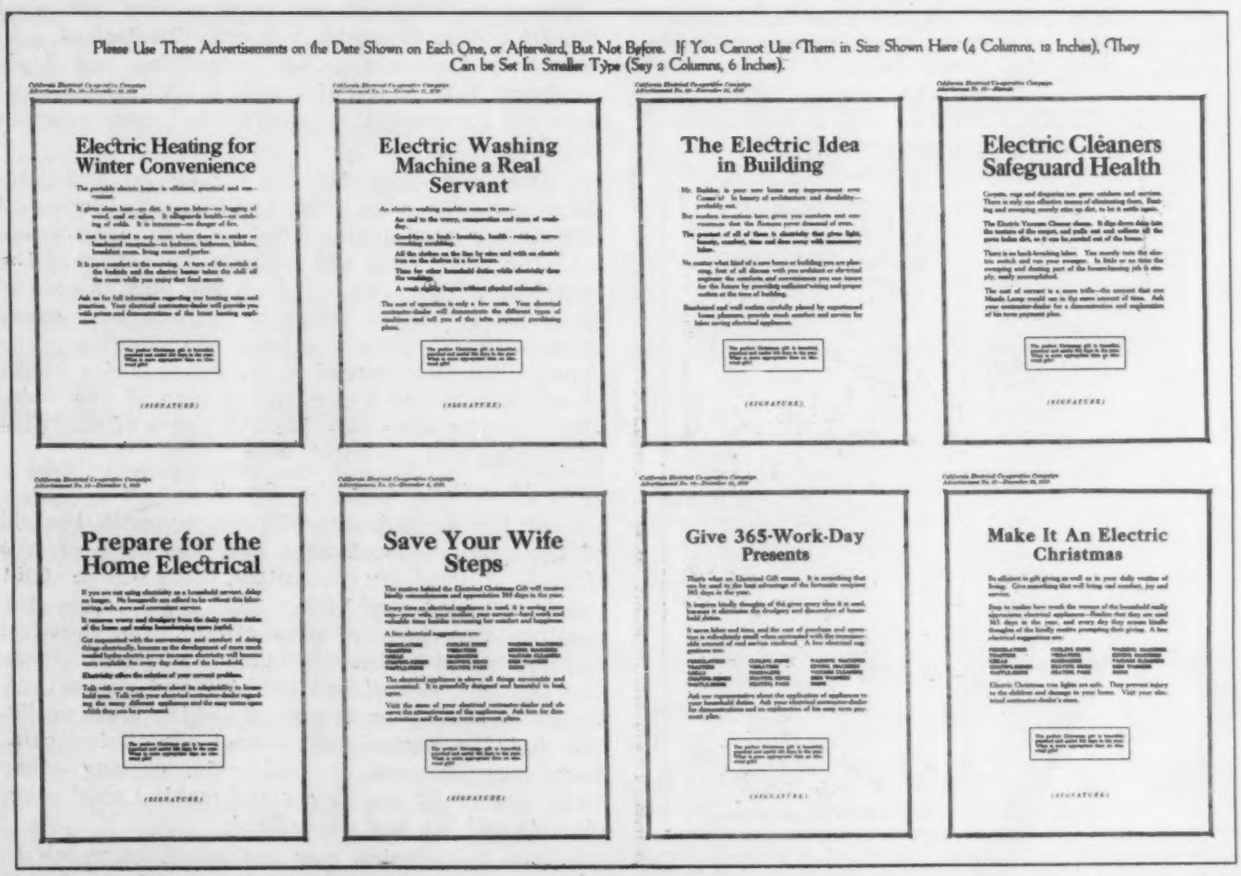
REPORT OF ADVISORY COMMITTEE FOR MONTH OF OCTOBER

The Committee held a meeting in conjunction with the Publicity Committee of the N. E. L. A. on the question of advertising and publicity. This meeting was held in Los Angeles and after eight hours of discussion the Advisory and Publicity Committees adopted the following Resolution:

RESOLVED that it is the sense of this meeting that the Advisory Committee continue to enlarge its efforts to encourage the electrical contractor-dealer to do more advertising and to group his advertisements around the power companies' advertisements in electrical pages; that it employ a specialist to assist the Campaign's secretary and the field men in carrying out this idea as rapidly as possible during November and December of this year and to help carry on the idea in 1920; that in connection with these electrical pages the Advisory Committee through its representatives will promote the use of news items regarding the service that is being rendered by electricity and electrical devices in homes, stores, factories and on farms; that the Advisory Committee will not distribute any news items which affect power companies' public policy questions, but confine itself to so-called appliance sales news, unless called upon by the publicity committee of the N. E. L. A. to promote some particular power company publicity idea or item. The representatives of the Advisory Committee are to be instructed to cooperate fully with the power companies and with contractor-dealers who advertise in each particular district.

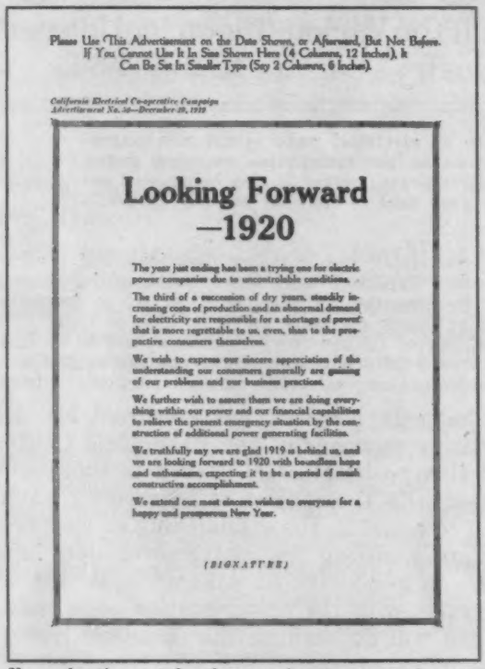
Chairman Newbert has employed Mr. Hixson, advertising manager of the Bakersfield Californian, to fill this position. Mr. Hixson is thoroughly acquainted with the subject of advertising. His duty will be to assist in the establishing of electrical sections, and assisting the contractor-dealers in advertising. In every city he will work in the closest cooperation with the power companies in that territory and will do nothing that has not the power companies' approval.

The electrical section is becoming popular in California. It has been established in Los Angeles, and to some extent in San Francisco, San Diego,


Please Use These Advertisements on the Date Shown on Each One, or Afterward, But Not Before. If You Cannot Use Them in Size Shown Here (4 Columns, 12 Inches), They Can be Set In Smaller Type (Say 2 Columns, 6 Inches).
Electric Heating for Winter Convenience
Electric Washing Machine a Real Servant
The Electric Idea in Building
Electric Cleaners Safeguard Health
Prepare for the Home Electrical
Save Your Wife Steps
Give 365-Work-Day Presents
Make It An Electric Christmas

Advertisements prepared by the California Electrical Cooperative Campaign and sent out to the electrical industry to promote the sale of electrical gifts at Christmas time.

Bakersfield, and Fresno. Arrangements have just been completed whereby the electrical section will be established over the system of the Southern



Please Use This Advertisement on the Date Shown, or Afterward, But Not Before.
If You Cannot Use It In Size Shown Here (4 Columns, 12 Inches), It Can Be Set In Smaller Type (Say 2 Columns, 6 Inches).

California Electrical Co-operative Campaign
Advertisement No. 1a—December 28, 1919

Looking Forward —1920

The year just ending has been a trying one for electric power companies due to uncontrolable conditions.

The third of a succession of dry years, steadily increasing costs of production and an abnormal demand for electricity are responsible for a shortage of power that is more regrettable to us, even, than to the prospective consumers themselves.

We wish to express our sincere appreciation of the understanding our consumers generally are gaining of our problems and our business practices.

We further wish to assure them we are doing everything within our power and our financial capabilities to relieve the present emergency situation by the construction of additional power generating facilities.

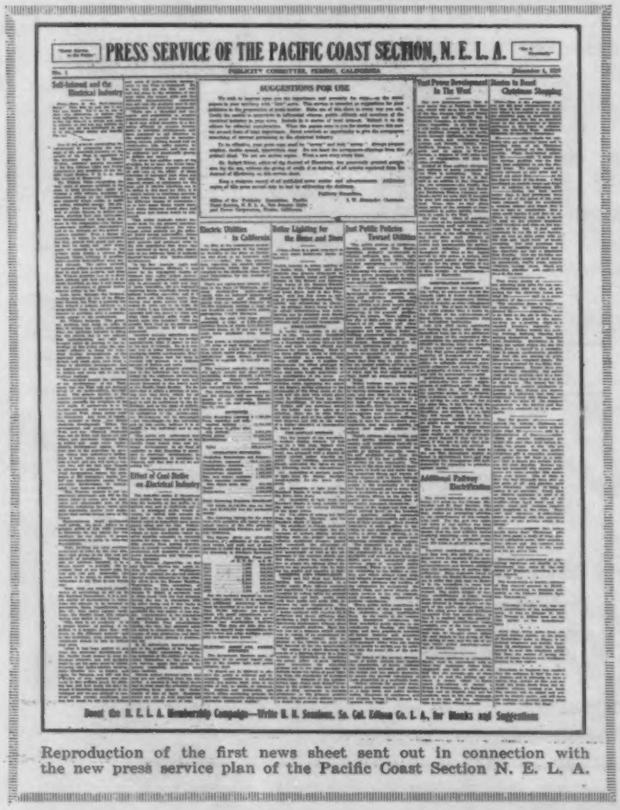
We truthfully say we are glad 1919 is behind us, and we are looking forward to 1920 with boundless hope and enthusiasm, expecting it to be a period of much constructive accomplishment.

We extend our most sincere wishes to everyone for a happy and prosperous New Year.

(SIGNATURE)

A New Year advertisement for the use of power companies, prepared by the California Electrical Cooperative Campaign.

California Edison Co., The San Joaquin Light and Power Corp., and the Pacific Gas and Electric Co. The Oakland dealers with the assistance of Mr. Jordan of the Pacific Gas and Electric Co., are at the present time formulating plans for an electrical section in Oakland.



PRESS SERVICE OF THE PACIFIC COAST SECTION, N. E. L. A.

PUBLICITY COMMITTEE, FRESNO, CALIFORNIA

SUGGESTIONS FOR USE

Reproduction of the first news sheet sent out in connection with the new press service plan of the Pacific Coast Section N. E. L. A.

Ten Thousand Pages of Electrical Advertising

BY MERREL E. HIXSON

(This authoritative article from the newly appointed director of cooperative advertising for the California Electrical Cooperative Campaign tells of the plans for the largest concerted advertising drive ever launched in the West. That it is being waged by the men of the electrical industry speaks much for their progressiveness and energy. All the electrical interests of the nation will be watching the success of the 1920 electrical advertising campaign in California.—The Editor.)

Not so long ago, less than three months, Howard W. Angus, secretary of the California Electrical Cooperative Campaign, was questioned at one of the meetings as to what number of full pages of electrical advertising it would be possible to obtain by waging a vigorous campaign to get the cooperation of the four branches of the electrical industry in order that full pages of electrical advertising and news matter attractively arranged could be put over in most of the daily papers of the State. Mr. Angus, to the surprise of almost everyone present, suggested that about six thousand pages during 1920 would be possible. Some of the more conservative present cut his estimate in half, while others laughed at such seemingly absurd assertions and even jokingly inquired if Mr. Angus had many such dreams.

Nevertheless, the six thousand page program is in full swing, what at first appeared the wildest of dreams is fast materializing, and Mr. Angus finds that the "Paul Reveres" of the California Electrical Cooperative Campaign who are passing the good word along to newspapers, contractor-dealers, jobbers, manufacturers, power companies and their employes, have raised his "ante of enthusiasm" and have set the mark at a ten thousand page program for the coming year.

One month from the day the Advertising Campaign idea originated, there had been an experienced advertising man employed to work in conjunction with the newspapers and individual members of the electrical industry, to sell them the idea as well as to plan a successful campaign in each and every town in the State large enough to support a newspaper. The news spread so rapidly that one month ahead of schedule a good percentage of the wide-awake papers were carrying full pages of electrical advertising and electrical news.

More Than 750 Pages Per Month —

At the present rate of progress, with the aid of the field representatives and members of the N. E. L. A. Publicity Committee, there will be about seven hundred and fifty full pages appearing monthly, carrying the messages of the electrical merchants and business-building news items. Trade Journals of the electrical industry and publications circulated among the newspapers of the West, realizing that the biggest educational advertising campaign ever launched in California, or any other state, was really under way and making good progress, spread the news broadcast.

It is a campaign new and novel, inasmuch as every business connected with the electrical industry

is a part of it—each doing, or to do, its part in waging the campaign in all communities, uniting the efforts to educate the public to greater uses of electricity and of electrical appliances. Some of the more progressive large city papers have advanced already from the one page idea to an electrical section to become a regular feature of the paper, comparing in size to the present day automobile section.

The California Electrical Cooperative Campaign and the electrical business interests are determined to place the industry foremost in the minds of the public, in the place that it should be, by consistent advertising and educational reading matter.

The newspapers that have had the opportunity to become acquainted with the Campaign's activities have taken an active part in building up the pages and have given their support in carrying out the work now under way. In most cases the editorial, news and business sections of the papers have cooperated to the fullest extent.

Increase of Journalistic Interest —

Heretofore some of the cosmopolitan newspapers were seemingly reluctant to give news mention of the vast projects now under way or recently completed, which are playing a major part in the development of the agricultural and manufacturing possibilities of the State. With the concentrated efforts of the organizers of the Campaign, all the newspapers of the State are coming to fully realize the vast importance of the hydro-electric development now under way, and are lending every effort to make known the future possibilities that such projects, when completed, will open to home seekers and manufacturers who, of recent years, have been handicapped by the lack of power.

The greater the development of power, the sooner the wealth of the State will increase. The added developments will benefit every branch of the electrical industry, making good the shortage of power which in some parts of the State has limited the sale of appliances for the home, factory, store and farm. The development of the now idle land of the State, thus brought about, means a larger population to the cities adjoining and increased wealth to the entire State.

Education of Public and Press —

The interest of the newspapers has largely been aroused through the activities of the California Electrical Cooperative Campaign in its efforts to gain the cooperation of the newspapers in waging the ten thousand page advertising campaign for 1920.

The newspaper men, like the general public, were not thoroughly posted as to how much the future development of the State really depends upon electrical energy, nor as to the hundreds of ways in which electricity is applied for the benefit of mankind today.

The success of the Campaign will depend upon the contractor-dealers to a large extent, in their willingness to tie-in with the power companies' educational advertisements that will appear regularly in each paper of the State, to be run in conjunction with the California Electrical Cooperative Campaign program. The contractor-dealer is not being asked to do anything other than build his own business by conservative advertising that will bring immediate returns. It is wholesome publicity that will place the electrical merchandising business on a sound footing with the people.

Books and Bulletins

The Romance of a Great Factory

"The Romance of a Great Factory" by C. M. Ripley is a book which opens up new lines of thought. It deals with electrical subjects—especially the contributions made by the Schenectady Works of the General Electric Company, which employs nearly twenty-five thousand men. It portrays the romantic human interest side of present day electrical industry, describing the curious, spectacular and sentimental aspects of the life, achievements, work and play of those employed in the big industrial plant. The book contains a 1000-word introduction by Dr. Chas. P. Steinnetz, together with 100 illustrations, photographs and artists' drawings of electrical scenes in and out of the shop. It is published by the Gazette Press, Schenectady, N. Y., price $2.00.

Irrigation in Montana

An exceptionally interesting booklet entitled "How to Create an Irrigation District in Montana" has been issued by the Montana Irrigation Commission, Daniel Boyle, J. E. McCormick, Lee Dennis and W. J. Haynes. The Irrigation Commission came into being under a recent Irrigation District Law passed by the Montana legislature, and the booklet in question aims to give publicity to the new conditions created by this law, and the possibilities of development. It quotes at length from the water right and irrigation laws of the State and supplies a large amount of valuable information for those interested in irrigation matters. A number of excellent photographs make the booklet attractive as well as useful.

Bureau of Mines

The following Technical Papers have been issued recently by the Bureau of Mines:

210. An Analytical Method for Detecting Blown-out Shots in Coal Mines. By G. F. Hutchinson and Jacob Barab.
231. Production of Explosives in the United States During the Calendar Year 1918, with notes on coal-mine accidents due to explosives, and list of permissible explosives tested prior to March 31, 1919. Compiled by Albert H. Fay.
234. Sensitiveness of Explosives to Frictional Impact. By S. P. Howell.
236. Abatement of Corrosion in Central Heating Systems. By F. N. Speller.
237. Safe Practice in Using Wire Ropes in Mines. By R. H. Kudlich and O. P. Hood.
239. Coke-Oven Accidents in the United States During the Calendar Year 1918. Compiled by Albert H. Fay.
242. Why and How Coke Should be Used for Domestic Heating. By Henry Kreisinger and A. C. Fieldner.

The Monthly Statement of Coal Mine Fatalities in the United States for August, 1919, compiled by Albert H. Fay, has also been published.

Catalogues

A neat and effective catalogue recently sent out by the Ohio Brass Company of Mansfield, Ohio, features Imperial Incandescent Headlights for Electrical Traction and Mining Service.

The Hotpoint division of the Edison Electrical Appliance Company issues a new catalogue of electrical appliances. with full details concerning each article illustrated.

Frederick J. Drake & Co., of 1006 Michigan Ave., Chicago, publish a catalogue including a large number of practical technical books.

SPARKS—Current Facts, Figures and Fancy

(Salvaging wrecks, heating water for industrial purposes, and drilling oil wells are among the most recent functions effectively performed by electricity. How to keep your crops safe at night, how to make bad fuel good, and where to live to avoid thunderstorms may also be learned here.—The Editor.)

Flood lighting is being used by a company in Southern California to keep ducks and geese away from crops at night.

* * *

In a recent report on the first completion of an oil well by electricity the engineer stated that he saved $3,655.20 by using electricity rather than steam.

* * *

Vertical searchlight beams arranged in different combinations are being used by the British air ministry to enable belated airplanes to locate their airdromes after dusk.

* * *

The petroleum industry uses millions of dollars' worth of electrical supplies every year. Among other things oil fields demand a network of telegraph and telephone wires.

* * *

The Pacific Coast of the United States is the most free of electric storms of any part of the country. The average number of thunderstorms at San Francisco is less than one per year. The average in the Gulf States is about 94.

* * *

A recently published report of an Eastern telephone and telegraph company states that slipping on stairs causes 34 per cent of all its accidents among women, and improper use of tools caused over 16 per cent of accidents among men.

* * *

An item in the peace treaty provides that "the Germans shall reconstruct parts of French territory which they maliciously destroyed during the war." It is reported that when the Germans took up the work the French labor unions objected to "cheap foreign labor" and demanded that the German workmen receive the same wages as themselves.

* * *

A plan to utilize the difference in level between the Mediterranean and the Dead Sea for the development of hydroelectric power, has recently been brought forward. A tunnel 37 miles long from the Dead Sea valley would give a drop of 1295 feet for power generation. The power would be used for lighting and industrial purposes in the Holy Land, and to pump water from Lake Genezareth to irrigate the Jordan Valley and the plain of Sharon. It is claimed that with regulating dams at Genezareth, there is enough water to irrigate several hundred thousand acres.

A Red Cross worker in Rumania evolved a new kind of fuel recently. Wood and coal have been exceedingly scarce in Rumania since the war, and the only fuel available to the relief man was a very low grade lignite which hardly burned at all. Finding some of the rivers thickly encrusted with oil scum, he conceived the idea of skimming this off the surface of a stagnant pool and soaking the lignite briquettes in it for a day or two. The result was a fuel which burned with a most satisfactory roar.

* * *

Heating water electrically for industrial and commercial purposes has been shown to be economical by the workings of a recently designed apparatus. This takes 3 kw., and is provided with a thermostat, by which the current is interrupted when the water reaches a given temperature. The average daily consumption in a given year was 15.4 units, and the maximum consumption on any one day 22 units, and the average number of hours of use per day about 6 hours. Electrical heating for water is of special importance in areas supplied by long-distance transmission.

* * *

A new method of attaching wire hawsers to the hulls of sunken vessels, where a diver cannot pass them under, is the limpet system. The limpet is a soft iron body, carrying a number of drill taps driven by small motors, the current being supplied from the salvage vessel. The limpet is lowered until it comes in contact with the hull of the vessel, when it is magnetized, causing it to cling to the plates. The drills are then started, and after running a predetermined length of time the current is switched off, the limpet is hauled to the surface, and the drills are left tightly fastened in the ship's hull. The ends of these drills are formed into eyes, to which the hawsers can be attached.

* * *

Flying kites is a popular sport with the Weather Bureau, though in justice to this serious-minded body let it be added that their motives are not as juvenile as the pastime would seem to indicate. Box kites are used for the purpose of studying atmospheric conditions far aloft. The "string" is piano wire unwound from a fixed reel. Every now and then lightning hits the wire and the latter disappears in what appears like a streak of rusty smoke. The kite-flyers would run great risks were it not that they take adequate precautions. Instruments used in connection with the apparatus frequently indicate a high voltage, and a small spark-gap would show an almost constant flow of current from kite and wire through the reel to the ground.

PERSONALS

E. C. Hutchinson, chief engineer with the Pelton Water Wheel Company, San Francisco, and an authority in water wheel design, has been elected president of the San Francisco Engineers' Club. This organization has meant much in the life of the local engineering community, not only providing a convenient meeting place for societies and committees, but being an important influence in unifying the profession. Here all problems of engineering interest come up for discussion at one time or another and receive the benefit of an exchange of opinion. The past year has been a most successful one under the leadership of A. E. Chandler, and the club looks forward to enlarged activities under the able leadership of Mr. Hutchinson.

A. B. West, electrical engineer of Riverside, Cal., is among recent visitors to San Francisco.

George Boring, manager of the Pacific States Electric Company, Portland, spent two days in Seattle recently while enroute to Spokane.

R. F. Oakes of the National Carbon Company, San Francisco, has returned from the East where he has been making a business visit to New York.

Samuel Graff, president of the Seward Light & Power Company, Seward, Alaska, is spending a few weeks in the States, arriving in Seattle November 30.

O. P. Hood, chief mechanical engineer of the U. S. Bureau of Mines, with headquarters in Washington, visited the San Francisco office of the Bureau during November.

Allyn G. Smith, who was graduated from the College of Electrical Engineering, University of California, in 1916, is in charge of the Radio School of the Army Air Service at Kelly Field, Texas.

H. McR. Jones, engineer with the Westinghouse Electrical and Manufacturing Company, who has been in the Orient on business, spent some time in San Francisco on his way back to his home in Toledo.

John M. Nicol, mining engineer for many years resident in Mexico and Central America, addressed the Foreign Trade Club of San Francisco, December 10th, on "Mexico—Its People and Problems."

G. E. Quinan, chief engineer Puget Sound Traction, Light & Power Company, Seattle, is attending the meeting of the Code Committee of the National Electric Light Association at Denver, Colorado.

J. I. Colwell, manager of the Western Electric Company, Seattle, left on December 1st for a two weeks' trip into California, taking in San Francisco and the electrical supply jobbers convention at Del Monte.

Prof. Dr. Y. Furuya of the electrical engineering department of Kiushiu University, Japan, is visiting the United States on a tour of inspection, studying water power development. He has recently been spending some time on the Pacific Coast.

H. L. Bargion of the Washington Supply Company represented Spokane and **Harry Byrne** of the North Coast Electric Company represented Seattle among the jobbers who recently convened at Del Monte for their quarterly convention and golf meet.

D. O'Hara and **A. L. Shaw** have been released from the service and announce the resumption of practice as consulting engineers, specializing in investigation, design, supervision, and industrial and power developments. Their offices are in the Phelan Building, San Francisco.

Cheng Wen Chih, representative of the China Industrial Committee, arrived recently in San Francisco, from where he will start on a tour of the United States, visiting large industrial plants and investigating industrial conditions, especially the lighting and power systems.

Ralph P. Clapp, President of the Electrical Cooperative League of Los Angeles, was a guest at the December 8th luncheon meeting of the San Francisco Electrical Development League in the Palace Hotel. Mr. Clapp spoke a few words of greeting from the electrical men of the Southland.

J. P. Davis, purchasing agent of the Belden Manufacturing Company, has been elected president of the Purchasing Agents Association of Chicago. Mr. Davis was formerly assistant purchasing agent for the Standard Underground Cable Company, of Pittsburgh, coming with the Belden Manufacturing Company as purchasing agent in 1916.

Arven Polhemus, who during the war was lieutenant in the Air Service Radio Section, is now engaged in electrical experimental work in the Standard Oil refinery at Richmond, Cal. He has been studying especially the mitigation of electrolytic corrosion. Mr. Polhemus is also associated in an advisory capacity with the Technical Service Company, 282 Monadnock Building, San Francisco, who specialize in technical advice to inventors.

A. Y. Tuel, pioneer in transpacific radio communication and a well-known wireless expert, has left the Navy radio service to return to the Federal Telegraph Company as division chief operator. Enlisting six days after the declaration of war, Lieutenant Tuel served as assistant to the Pacific Coast communication superintendent, U. S. N., and has actively assisted in the maintenance and extension of transpacific radio service under war conditions.

Dr. Elwood Mead, professor of rural institutions at the University of California and a specialist on irrigation problems, has been appointed by Secretary of the Interior Franklin K. Lane to act as one of the Council of National Progress. The purpose of this council is to make a study of policies and plans which should be followed in national development. The electrical industry is especially represented on this body by **Theodore N. Vail**, president of the American Telephone and Telegraph Company.

Daniel C. Jackling, financier and director of great copper mines and power interests, has been awarded the Distinguished Service Medal by Congress "for exceptionally meritorious and distinguished service as director of the United States Government explosive plants during the war." This patriotic work he began in 1917. Mr. Jackling is intimately connected with the electrical industry as President of the Utah Power and Light Company. He is vice-president and managing director of several large mining corporations, including the Utah Copper Company, Ray Consolidated Copper Company, Chino Copper Company, Nevada Consolidated Copper Company, Butte and Superior Mining Company, Alaska Gold Mines Company, and others. Mr. Jackling is at present in New York City but will return before Christmas to San Francisco, where he has offices in the Hobart Building.

Herbert C. Hoover, who has been spending some time in resting at his Palo Alto home, has returned to public life. He has recently been appointed by the President to the new industrial commission, which is to consider and report on the labor situation. This comes as a gratifying response to the efforts of the Engineering Societies to secure the appointment of an engineer on this commission. Mr. Hoover is also slated to be the next president of the American Institute of Mining and Metallurgical Engineers.

J. G. Pomeroy of Los Angeles has been calling on his electrical friends in San Francisco.

H. M. Littell, electrical engineer of Los Angeles, recently spent some days in San Francisco.

A. H. Naftzger, member of the Industrial Accident Commission, Los Angeles, has recently visited San Francisco.

J. H. Wiggins, assistant engineer of the Bartlesville station of the U. S. Bureau of Mines, is at present in the San Francisco office engaged in work relating to evaporation losses of oil in storage.

Floyd Averill of the Fobes Supply Company, Portland, was one of the two Portland representatives at the Del Monte convention of Electrical Supply Jobbers which took place early in December.

John Lewis, engineer manager of the Warm Springs Irrigation project, Oregon, and formerly State engineer, has resigned, and will establish an office in Portland where he will practice and make his home.

H. D. Randall of the Capital Electric Company and C. B. Hawley of the Intermountain Electrical Supply Company came all the way from Salt Lake City to attend the recent Jobbers' Convention at Del Monte.

Chas. H. Merz of Merz and McLelland, consulting engineers of London, was a recent visitor in San Francisco. He has just completed an investigation of railway electrification in Australia and is now returning to England.

M. J. Gavin, refinery engineer, U. S. Bureau of Mines, with headquarters at the Salt Lake Station of the Bureau, who is in charge of the Bureau's investigations relating to oil shale, spent a week during November at the San Francisco office of the Bureau.

J. B. Fisken, president of the Northwest Electric Light & Power Association, attended the meeting of the Inductive Interference and Overhead Systems Committee of the National Electric Light Association held in Denver on Dec. 1st, 2nd and 3rd.

C. F. Parker, for the last 10 years an inspector with the Department of Electricity, San Francisco, has been elected manager of Meyers Electric Safety Switch Co. and commencing January first will devote his entire time to the interests of that company.

C. R. Scudder of St. Louis recently passed through San Francisco on his way back from Alaska, where he spent the last five months hunting big game. He was caught by the winter and made a seven hundred mile dog sled trip to get out. His entire experience has been in the nature of a Big Adventure, with many a story of exciting escapades.

Guy W. Talbot, president of the Pacific Power and Light Company of Portland, and also of the Portland Gas & Coke Company, arrived home recently after a visit to New York and other Eastern points. During his stay Mr. Talbot was obliged to undergo an operation, performed in Chicago, and has returned home to complete his convalescence.

F. D. Weber, vice-president of the State Board of Engineering Examiners, made a business trip to Eugene during the past week.

Bob Stubbs of Stubbs Electric Company, Portland, was one of the popular visitors at the recent convention of the Pacific Coast Division, Electrical Supply Jobbers at Del Monte.

A. L. Powell, Illuminating Engineer in the laboratory of the Edison Lamp Works, Harrison, N. J., delivered a very interesting illustrated lecture before the Utah Section of the American Institute of Electrical Engineers in Salt Lake City on November 26. Mr. Powell discussed in an able manner the various phases of industrial, store and residence lighting.

John A. Britton, vice president and general manager of the Pacific Gas and Electric Company, has recently undertaken a trip of inspection of the Lake Spaulding and subsidiary dams, accompanied by P. M. Downing, chief engineer of the company. In order to meet the increased demand for power in the valley agricultural regions, it has been found necessary to enlarge this dam, and the trip was an inspection of this work.

Russell W. Stovel, who recently returned from France, where, as Lieutenant-Colonel of Engineers, he served as Chief of the Terminal Facilities Division of the Army Transport Service, has been appointed a consulting engineer of Westinghouse, Church, Kerr and Company, Inc., and as a member of that organization will devote his entire time to the company's electrical and mechanical work. Mr. Stovel has had an unusually comprehensive experience in the electrical and mechanical problems connected with central power station and steam railroad electrification work, together with a most valuable experience in mechanical handling at docks and terminals. In 1914 Mr. Stovel left Westinghouse, Church, Kerr & Company to become managing engineer for Gibbs and Hill, consulting engineers, of New York. In France Lieutenant-Colonel Stovel served as electrical and mechanical engineer in charge of the Pier Utilities Branch of the Terminal Facilities Division, and later as Chief of the Terminal Facilities Division in charge of all matters relating to the procurement, maintenance and operation of all terminal facilities under the jurisdiction of the Army Transport Service.

OBITUARY

Robert A. Faries, founder and president of the Faries Manufacturing Company of Decatur, Ill., died on Monday, November 17th. Mr. Faries was known not only as the able head of a large firm but also as an inventor. He was one of the first men to devise adjustable fixtures for electric lights, making it possible to move lights from one position to another and yet have some stability in their position.

When check-rowing corn planters were instituted he invented a machine to make and fasten the wire links. A type of steam boiler was also among his patents.

In addition to his national reputation Mr. Faries held a distinctive and personal place in his own community, and his death is deeply mourned by many friends and admirers.

A. R. Fuller, who recently joined the sales force of the Western Electric Company, San Francisco, died on December 9th of heart disease. Mr. Fuller was formerly manager of the Stewart Fuller Company of San Francisco.

William Allen Brown, for sixteen years secretary and chief financial officer of the Waclark Wire Company, New York City, died on Monday, Nov. 10th.

Meeting Notices for Electrical Men

(Del Monte has been the scene of a number of important meetings during the past two weeks, including that of the Electrical Supply Jobbers and of several N. E. L. A. committees. In San Francisco engineering societies and the Contractor Dealer Association have held well-attended gatherings, while interesting meetings are also reported from the Northwest and the Intermountain district.—The Editor.)

N. E. L. A. Committee Meetings

Commercial Committee —

On Dec. 3rd a meeting of the Commercial Committee, Pacific Coast Section of the National Electric Light Association, was held at Del Monte, the following members being present: K. E. Van Kuran, chairman; R. A. Balzari; J. O. Case; A. W. Childs; H. H. Courtwright; F. D. Fagan; R. E. Fisher; C. B. Hall; A. H. Halloran; D. E. Harris; C. R. Hunt; M. L. Scobey; A. E. Wishon; Garnett Young. Present as invited guests were R. M. Alvord; Howard Angus; T. E. Bibbins; M. A. De Lew; W. R. Dunbar; J. T. Jameson.

Papers were read by Garnett Young on "How the Electrical Industry Should Cooperate With the Architect and Home Builder;" and by C. R. Hunt on "The Fifty Degree Motor Equipment in Relation to the Central Station." F. D. Fagan read an outline of his proposed paper on "The Value of Proper Illumination," and preliminary data was presented by J. O. Case on "Unelectrified Horsepower."

The chairman announced the appointment of R. E. Fisher as chairman of the sub-committee to prepare the paper on "Central Station Power vs. Gas Engines," instead of Carl Johnson, who will be unable to prepare such a paper on account of his protracted absence from the coast.

A committee to gather opinions from the industry regarding the possibility of rating motors on the basis of kilowatt input, was appointed as follows: R. A. Balzari; J. O. Case; Carl Johnson; A. W. Childs; R. E. Fisher; A. E. Holloway; E. B. Criddle; E. B. Walthal; C. R. Hunt; Geo. N. Rooker.

The next meeting of the commercial committee will be held about the middle of January.

Executive Committee —

A special meeting of the Executive Committee of the Pacific Coast Section of the National Electric Light Association was held at Del Monte on December 5th, the following members being present: President A. E. Wishon; L. H. Newbert; C. C. Hillis; S. M. Kennedy; E. O. Shreve; A. B. West; A. H. Halloran. Present by invitation were John A. Britton, chairman Public Policy Committee; T. E. Bibbins, chairman Committee on Cooperation; I. W. Alexander, chairman Publicity Committee; P. R. Ferguson, chairman Accounting Committee; K. E. Van Kuran, chairman Commercial Committee; H. N. Sessions, chairman Membership Committee; Garnett Young.

The meeting opened with a discussion of convention plans for the Pacific Coast Section, the consensus of opinion being that the most practicable time and place for the convention was May 7th to 16th at Pasadena. This was provisionally accepted.

A report was presented by Secretary A. H. Halloran showing action taken and results secured on all resolutions adopted at the Coronado convention.

I. W. Alexander reported on the activities of the Publicity Committee, and displayed copies of the first Press Service Bulletin.

H. N. Sessions of the Membership Committee, made an appeal for the active support of company heads in stimulating interest in N. E. L. A. membership. P. R. Ferguson presented a report of the Accounting Committee's activities, and K. E. Van Kuran on the Commercial Committee. Arrangements were made to secure widespread national publicity for the material in Garnett Young's paper on "How the Electrical Industry Should Cooperate with the Architect and Home Builder." The Section pledged its active support for the enforcement of the California Industrial Accident Commission's "Lighting Code" and "Electrical Utilization Safety Orders."

BUILDERS OF THE WEST — LXVII

LIEUTENANT-COLONEL E. J. HALL

"America's most distinctive contribution to the war in the air," is the tribute paid by Benedict Crowell, Director of Munitions, to the Liberty Engine. To a practical engineer of the West, E. J. Hall of the Hall-Scott motor works of Berkeley, California, is due a large share of the credit for perfecting this typically American aircraft engine. Together with J. C. Vincent of the engineering staff of the Packard Motor Car Company he laid out the plans and undertook the actual work of development. With infinite skill he combined in its design the best elements from a score of sources, and the final successful product was capable of great quantity production. No technical achievement of the whole war ranks higher than the Liberty Engine. To Lieutenant-Colonel E. J. Hall, Air Service, U. S. A., one of its chief designers, this issue of the Journal of Electricity is affectionately dedicated.

National Electric Light Association Meetings in Denver

On December 1st, 2nd and 3rd the Committee on Overhead Lines and the Committee on Inductive Interference met in Denver, Colorado.

The Pacific Coast Section was represented by Messrs. L. M. Klauber, R. E. Cunningham and J. E. Woodbridge. The Northwest Electric Light & Power Association was represented by Messrs. G. E. Quinan, J. B. Fisken, L. T. Merwin and H. R. Wakeman.

The Inductive Interference Committee devoted much of its time to a review of the situation in California as affected by the General Order of the Railway Commissioner of that State. The sub-committees on current problems and on data, bibliography, etc., perfected their programs and advanced their work.

One point of interest to Western engineers in the work of the Overhead Lines Committee was the endorsement by this committee of research work on the deterioration of porcelain insulators.

The meetings of the two committees closed with a trip over Lookout Mountain, given by the officers of the Denver Gas & Electric Company.

San Francisco Electrical Development League

On "Electrical Retailers' Day" at the League, December 1st, J. C. Hobrecht of Sacramento talked on "How the Electrical Dealer Looks Upon the Present and Future of the Retailing of Electrical Goods." Mr. Hobrecht emphasized the necessity of building up a definite merchandising policy, and strongly urged that electrical dealers enter more extensively into advertising. He estimated that at least 2½ per cent of a dealer's total annual outlay should be spent on advertising and publicity in the proper mediums. W. D. Kohlwey, as chairman of the day, introduced the speaker.

The meeting of December 8th was one of the best-attended of the year. Commander Bryson Bruce, U. S. N., engineer officer in charge of the installation of electrical machinery on U. S. S. "California" at Mare Island Navy Yard, spoke on "Electric Propulsion of Ships." Commander Bruce described the equipment of electrically driven battleships, especially the "California," which he termed "the crowning achievement of the application of electricity on board ship." Wilfred Sykes, in charge of the application of electricity to ship propulsion for the Westinghouse Electrical and Manufacturing Company, Pittsburgh, was present as a guest and spoke a few words on the adoption of the electrical drive by the Navy Department. Representatives of the U. S. Shipping Board and of the leading shipbuilding yards about San Francisco Bay were at the meeting by special invitation. Aubrey Drury, associate editor of the Journal of Electricity, acted as chairman of the day.

Northwest Electric Light & Power Association

The new officers of the Northwest Electric Light & Power Association are as follows:

John B. Fisken, president, Seattle, Washington.
F. D. Nims, vice-president for Washington, Seattle, Washington.
George L. Myers, vice-president for Oregon, Portland, Oregon.
W. R. Putnam, vice-president for Idaho, Boise, Idaho.
F. M. Kerr, vice-president for Montana, Butte, Montana.
L. A. Lewis, secretary and treasurer, Spokane, Washington.

The Executive Committee of the Northwestern Electric Light & Power Association met in Portland on Nov. 26th, for consideration of matters of general nature, especially the representation of the Association at the Pasadena Convention and the question of proper organization of sections, accounting, commercial public relations, hydroelectric and technical sections scope, defining their duties and work, and the consideration of appointment of the Governing Committee of each Section. The question of effecting closer co-operation with contractors, dealers and jobbers, and manufacturers was discussed, and the Association will name an Advisory Committee from the personnel of the Governing Committee of the Commercial Section to work out the problem of co-operation. The Advisory Committee will be so chosen that it will also include representatives of the contractors, dealers, jobbers and manufacturers.

The Public Policy Committee of the Association met Nov. 25 at the call of the president, but on account of the lack of a quorum, the meeting adjourned probably to meet again after the first of the year.

The Public Policy Committee of Oregon met Tuesday, Nov. 25, and organized and elected a chairman for the year and considered matters of public policy affecting Oregon.

The following members have been appointed as the Governing Committee of the Hydroelectric and Technical Committee of the Northwest Electric Light & Power Association:

For Three Years

G. E. Quinan (chairman), Puget Sound T. L. & P. Co., Seattle;
W. H. Trenner, Idaho Power Co., Boise;
R. M. Boykin, North Coast Power Co., Portland.

For Two Years

H. L. Walther, California-Oregon Power Co., Medford;
H. R. Wakeman, Portland R. L. & P. Co., Portland;
H. H. Schoolfield, Pacific Power & Light Co., Portland.

For One Year

J. B. Fisken, Washington Water Power Co., Spokane;
L. T. Merwin, Northwestern Electric Co., Portland;
F. D. Nims, Washington Coast Utilities, Seattle.

The following members have been appointed on the Public Policy Committee of the same association by President Fisken:

G. C. Pierce, president, Northwestern Electric Company; G. W. Talbot, president, Pacific Power & Light Company; F. F. Griffith, president, Portland Railway Light & Power Company (chairman); A. W. Leonard, president, Puget Sound T. L. & P. Co.; George L. Meyers, Pacific P. & L. Co.; W. R. Putnam, Idaho Power Company; F. M. Kerr, Montana Power Company; F. D. Nims, Washington Coast Utilities; F. F. Johnson, president, Idaho Power Company.

The following members have been appointed on the Public Policy Committee for Oregon:

R. M. Boykin, vice-president and general manager, North Coast Power Company; A. B. Bower, manager, Condon Electric Company; C. M. Brewer, vice-president and general manager, Mountain States Power Company; C. J. Edwards, president, Coast Power Company; T. H. Foley, vice-president and manager, Bend Water, Light & Power Company; O. B. Frank, manager, Douglas County Light & Water Company; H. V. Gates, Hillsboro Power & Investment Company; J. P. Lottridge, manager, Eastern Oregon Light & Power Company; L. P. Lumpee, manager, Vale Electric Company; H. F. McCormick, manager, St. Helens Light & Power Company; R. J. Moore, president, Yamhill Electric Company; J. F. Orr, district manager, Idaho Power Company; Guy C. Pierce, vice-president and general manager, Northwestern Electric Company; E. G. Robinson, president, Molalla Electric Company; H. J. Rowe, general manager, Stayton Light & Power Company; C. M. Shinn, vice-president and manager, Cottage Grove Electric Company; J. T. Thompson, manager, Sheridan Light & Power Company; R. M. Townsend, Portland Railway, Light & Power Company; H. L. Walther, general superintendent, California-Oregon Power Company; George L. Meyers (chairman), Pacific Power & Light Company.

American Association of Engineers

At the annual meeting of the San Francisco Chapter of the American Association of Engineers William S. Wollner was unanimously elected to the presidency of the chapter for the coming year. Prior to the announcement of the result of the election, the retiring president, J. H. Knowles, presented his report of the activities of the association during the past year, which was supplemented by reports of Secretary A. G. Mott and Treasurer A. R. West telling of the remarkable growth of the chapter during the year and the excellent state of its treasury.

In a spirited election, J. F. Johnston was elected first vice-president; W. H. Phelps, second vice-president; L. R. Kessing, treasurer, and A. G. Mott, secretary. Mr. Wollner, in accepting the presidency, outlined the plan he believed the association should follow in assuming the obligation that the engineer owes to the community. He stated that the American Association of Engineers is ideally fitted to participate in the presentation and solution of problems that are vital to the community, the commonwealth and the nation.

Electrical Engineers Meet

At the meeting of the Seattle Section of the American Institute of Electrical Engineers held on November 17, the session was entirely taken up with listening to an address by Dr. F. B. Jewett, chief engineer of the Western Electric Company, New York. His address related to means of communication during the war by the Allies, both on the battle-front and in naval operations. He took up the means for telegraph and telephone communication, also radio-telephony as developed on naval ships and on the battle front. He spoke of the success of apparatus on airplanes whereby aviators could communicate with each other in the air as well as with stations on the ground. All new apparatus was illustrated by lantern slides, and in closing he devoted some time to moving pictures involving operations in the battle-fields. The process of locating heavy guns by sound waves was described and illustrated.

Engineers' Club of San Francisco

At a special meeting of the Engineers' Club of San Francisco, in the club rooms in the Mechanics Institute Building, Thursday afternoon, December 4th, M. M. O'Shaughnessy, City Engineer of San Francisco, gave an interesting talk on the "Hetch-Hetchy Power Project." Illustrative of the topic, Mr. O'Shaughnessy displayed three reels of moving pictures showing construction work under way at Hetch Hetchy, Lake Eleanor, and in various shafts and tunnels connected with the project. The membership gave the speaker a vote of thanks at the conclusion of his address.

Electrical Supply Jobbers' Association

The meeting of the Electrical Supply Jobbers at Del Monte was well attended, and the golf tournament played off with the customary enthusiasm.

C. B. Hawley again won the honor of having his name placed on the old copper cup in the Jobbers' match.

The Pass & Seymour cup, after five years or more of hard-fought competition, finally passes to C. C. Hillis for permanent possession.

The conditions of play for this cup required that it must be won three times before becoming the permanent trophy of the winner. The many times it has passed through the engraver's hands makes it a valuable and interesting trophy of the game.

Mr. Hillis also succeeded in having his name placed on the Turner trophy for the second time.

The Central Station cup was won by A. Emory Wishon, president of the Pacific Coast Section of the N. E. L. A. While his experience in the game of golf does not equal that of Mr. Hillis and others, he bids fair to be a strong contender for trophies.

The Manufacturers' cup, presented by the Jobbers, was won by R. A. Balzari of the Westinghouse Company.

Dr. Jewett Speaks in Los Angeles

Dr. Frank B. Jewett, chief engineer Western Electric Company, and during the war lieutenant-colonel in the Signal Corps, U. S. A., delivered two lectures in Los Angeles in the first week of December, under the auspices of the American Institute of Electrical Engineers. His subject was "Some War-Time Developments in Electrical Communication and Allied Fields." On Tuesday evening, December 2nd, he gave a talk on this topic at a "popular meeting" in the auditorium of the Los Angeles Polytechnic High School. A "technical meeting," devoted particularly to a discussion of the technical features of the same subject, was held on Friday evening, December 5th, in Choral Hall. Both meetings were well attended. Participating were the local sections of the American Chemical Society, American Institute of Architects, American Institute of Mining Engineers, American Society of Civil Engineers, American Society of Mechanical Engineers, Engineers and Architects Association, National Electric Light Association, Electric Cooperative League, the Synchronous Club and Academy of Sciences.

Portland Sections, A. I. E. E. and N. E. L. A.

At the regular monthly meeting of the Portland sections, American Institute of Electrical Engineers and National Electric Light Association, on Tuesday evening, December 9th, a discussion of "Central Station Steam Heating Problems" was given by O. L. LeFever and A. D. Leach of the Northwestern Electric Company. Lantern slides were used to illustrate the subject. Refreshments were served at the meeting, which was held in the auditorium of the University Club, Portland.

Advisory Committee, California Electrical Cooperative Campaign

The advisory committee, California Electrical Cooperative Campaign, met at Hotel Del Monte on Tuesday, December 2nd. Important matters relating to the progress of the campaign were discussed, especial attention being paid to advertising. Full consideration was given to the plan now being put into successful operation all over the State, involving the organization of special electrical advertising pages and sections in daily and weekly newspapers. The necessity of securing adequate and telling news items was emphasized, and valuable suggestions were made as to building the industry through proper publicity. Merrel E. Hixson, formerly advertising manager of the Bakersfield "Californian," and recently appointed advertising field representative of the campaign, was present at the meeting.

The question of a change in the name of the campaign organization was discussed, it being felt by some of the members that a designation was required to indicate the permanency of the cooperative council. A valuable report was rendered on the use of the bonus to employes as a builder of business. G. E. Arbogast told of the working up of plans for a "Model Electrical Home," being widely published in Los Angeles, several thousand copies having been issued for distribution.

Those present at the committee meeting were Lee H. Newbert, chairman; G. E. Arbogast, R. M. Alvord, A. W. Childs, M. A. De Lew, D. E. Harris, M. L. Scobey, K. E. Van Kuran, A. E. Wishon, Howard Angus, secretary; M. E. Hixson, advertising field representative. Guests present were T. E. Bibbins, president Pacific States Electric Company, and Aubrey Drury, associate editor of the Journal of Electricity.

Electrical Contractors and Dealers' Association of San Francisco

At the meeting of November 28th, Electrical Contractors and Dealers' Association of San Francisco, it was decided that any bids should be opened at the request of any interested bidder after the closing time of bids. D. E. Harris, representing the California Electrical Cooperative Campaign, addressed the meeting and urged that contractors advertise in a manner similar to the electrical dealers. A special committee was appointed to confer with the Cooperative Campaign on this matter. Clyde L. Chamblin presided.

Proposed changes in the by-laws of the association, drafted by Secretary Louis Ardouin, were given their first reading at the meeting of December 5th. Important subjects affecting the industry were discussed, including the proposed amendments to City Ordinance 2582, pertaining to electrical wiring regulations. The association unanimously endorsed the ordinance as revised. W. D. Kohlwey acted as chairman of the meeting.

Committee Activities

The Overhead Systems Committee of the National Electric Light Association is planning in its report to bring to the attention of the industry any new devices that, in the Committee's opinion, would be useful in line construction or line maintenance work. In order to make the report as useful as possible, the committee would be glad to get into touch with any manufacturers making such tools or devices for use in overhead line work.

It is not the committee's plan to include in its report anything whatever regarding the various lines of standard fixtures that are on the market, but to call attention to special articles that might prove of particular value to operating companies.

Any data regarding such items should be sent to the chairman of the Overhead Systems Committee, at the above address.

Otto A. Knopp, vice chairman of the N. E. L. A. meter committee and representing the Pacific Coast Section thereon, has completed a trip throughout California in order to confer with the other California members of this national committee. These include **A. E. Coney,** Great Western Power Company, San Francisco; **W. R. Frampton,** Southern California Edison Company, Los Angeles; **C. F. Gilcrest,** San Joaquin Light & Power Corporation, Fresno; **John M. Morris,** Westinghouse Electric & Manufacturing Company, Los Angeles, and **W. H. Talbott,** San Diego Consolidated Gas & Electric Company.

HAPPENINGS IN THE INDUSTRY

WESTERN POWER SITUATION RELIEVED BY RAINFALL

With heavy snow in the mountains and commensurate rainfall in the lower foothills, the companies that supply San Francisco and the Coast cities with electric light and power are now running their hydroelectric plants under more favorable circumstances than for several weeks.

The Pacific Gas & Electric Company reports forty-two inches of snow at its Spaulding power station, which is exceptionally heavy for this time of year, and promises well for the season.

There is now adequate water to feed most of the turbines to capacity, and as a result the company is in a position to reduce materially the demands upon its steam auxiliary plants that have recently been run to a load beyond their normal economic speed rate.

The Sierra & San Francisco Power Company reports a marked improvement of the situation as a result of the snowfall, but its principal plants at the higher altitudes have not yet profited thereby. The rainfall at lower altitudes has already given it about 25 per cent additional power, and the promise of a thaw higher up will probably put their supply at normal almost immediately.

Meanwhile the relief afforded by the rain has been such as to reduce the load on its local power plant to such an extent that it is no longer necessary to overwork the boilers so heavily.

This means better and more complete combustion of the oil fuel used and a consequent reduction of the smoke nuisance.

ELECTRICAL DEVELOPMENT IN THE ORIENT

A preliminary announcement has been made in Japan of a new hydroelectric project which proposes to develop the water power of the Hime River and neighboring streams in Echigo Province, to be capitalized at $15,000,000.

The Inawashiro Hydroelectric Company, one of the largest water-power plants in Japan, held its stockholders' meeting on October 25 and among others the third extension of the system was presented for approval. The total cost of extension, which includes the construction of the third power-house and the erection of new transmission lines to Tokyo, will amount to about $12,500,000. The total power obtainable from the extension is 26,000 kilowatts.

The auxiliary steam power plant of the Kinugawa Water-power Company, which has been under construction for some time, is near completion and by the end of September the firing of boilers is expected. The output of the plant is 8,000 kilowatts in total and will be used as auxiliary to the water-power plant. The company serves the city of Tokyo and much inconvenience has been felt by shortage of power from its water-power plant.

ELECTRIC POWER PRODUCTION

The following reports of electric power output for February, March, and April, compiled by the Division of Power Resources, U. S. Geological Survey, are based on returns received from about 3,100 electric power plants engaged in public service, including central stations, electric railways, and certain other plants, the output of which contributes to the public supply. Returns were received from plants whose aggregate capacity is about 90 per cent of the generating capacity of all public utility plants. Estimates of the output of plants which did not make returns were made from available information. The total "estimated" power is only about 7 per cent of each monthly total. The average daily output in kilowatt-hours for the different months is as follows: February, 106,540,000; March, 101,620,000; and April, 100,880,000. Amount produced by water power: February, 39 per cent; March, 42 per cent; and April, 43 per cent.

THOUSANDS OF KILOWATT-HOURS PRODUCED

	By Water Power			By Fuels		
State	February	March	April	February	March	April
Alabama	39,341	30,275	28,488	11,059	4,907	4,477
Arizona	3,967	5,689	7,577	17,448	21,807	16,488
Arkansas	79	72	69	6,252	6,625	6,030
California	187,486	215,914	228,775	38,268	33,939	33,645
Colorado	13,141	14,254	15,019	17,279	17,144	14,365
Connecticut	7,043	14,884	15,804	42,589	37,469	35,525
Delaware	—	—	—	5,551	4,784	4,655
District of Columbia	—	—	—	18,094	19,331	18,457
Florida	678	892	777	8,582	8,789	7,776
Georgia	35,909	37,264	31,404	6,054	6,082	6,200
Idaho	41,430	39,913	36,019	168	257	155
Illinois	15,611	15,282	16,134	198,899	207,673	194,109
Indiana	3,682	3,654	3,511	52,342	54,617	51,980
Iowa	44,182	48,696	48,737	23,993	24,964	23,646
Kansas	1,267	1,223	913	29,619	30,458	30,870
Kentucky	4	4	4	18,794	19,127	18,555
Louisiana	—	—	—	14,130	14,876	14,582
Maine	18,831	20,157	18,708	73	73	93
Maryland	284	371	358	18,435	13,898	11,442
Massachusetts	18,898	31,365	32,322	101,799	100,030	90,601
Michigan	52,236	59,649	65,211	97,285	96,125	88,363
Minnesota	18,303	32,740	43,204	26,826	15,220	7,261
Mississippi	—	—	—	5,115	5,393	4,927
Missouri	4,297	5,920	4,418	37,207	40,551	36,245
Montana	68,408	77,869	77,853	883	888	821
Nebraska	748	959	1,118	15,493	16,413	16,004
Nevada	3,198	2,812	2,470	137	121	727
New Hampshire	4,946	5,763	5,683	2,309	2,114	1,893
New Jersey	162	197	187	75,665	76,412	76,642
New Mexico	57	56	80	1,416	1,556	1,455
New York	195,219	223,078	220,677	288,271	288,537	270,644
No. Carolina	42,645	46,318	45,755	7,149	7,426	7,082
North Dakota	—	—	—	2,312	2,400	2,103
Ohio	3,053	3,932	3,565	189,041	194,937	183,702
Oklahoma	167	183	149	13,080	13,796	12,989
Oregon	27,876	29,113	27,248	4,754	3,759	3,539
Pennsylvania	55,098	62,509	58,466	238,970	246,930	233,597
Rhode Island	562	1,042	726	28,767	18,405	16,839
So. Carolina	43,899	43,394	43,287	3,876	4,010	3,676
So. Dakota	2,683	3,579	4,104	2,949	3,208	1,920
Tennessee	43,640	45,222	37,999	9,774	10,680	10,405
Texas	266	284	305	43,070	47,616	44,816
Utah	13,135	15,463	17,434	—	—	—
Vermont	13,428	18,574	19,482	173	179	187
Virginia	17,833	20,122	19,298	17,254	18,709	16,539
Washington	70,779	79,346	74,575	4,171	4,521	4,164
W. Virginia	1,378	1,593	1,642	52,620	58,108	59,396
Wisconsin	32,534	47,531	48,880	32,916	33,075	24,682
Wyoming	248	172	138	3,580	3,898	3,514
Totals	1,148,634	1,308,329	1,308,573	1,834,487	1,841,837	1,717,788
Totals, by water power and fuels				2,893,121	3,150,166	3,026,361

FIFTIETH ANNIVERSARY OF THE WESTERN ELECTRIC COMPANY

This year marks the completion of fifty years of existence of the Western Electric Company. The company had its beginning back in 1869 when the partnership of Gray and Barton was formed to manufacture telegraph apparatus, bells and buzzers. This was in the very infancy of the commercial application of electricity.

The firm of Gray and Barton was succeeded in 1872 by the Western Electric Manufacturing Company, which in turn was reorganized in 1881, when it became the Western Electric Company. The company is, therefore, the oldest manufacturer in the United States engaged continuously and exclusively in producing electrical apparatus.

The growth of the company from its earliest days is a reflection of the growth of the electrical industry. It may be interesting to note that the total business of the company for 1885 was $1,312,000, which in 1919 will be just about tripled in one week.

The Western Electric Company maintains about twenty houses in the United States and has established manufacturing and distributing centers in all the important cities of the

globe. The manufacturing plant at Hawthorne, Chicago, covers 210 acres of land, sixty acres of forest space, and employs nearly twenty thousand men and women.

Fifty years may not be such an extraordinarily long span in the life of other businesses, but in the electrical business it represents almost the total life of electricity as a commercial asset. To fittingly celebrate this anniversary, the employes of the San Francisco house plan to hold an entertainment and informal dance on the night of December 19, 1919.

DIESEL ENGINES FOR WOODEN VESSELS

Contracts are to be closed by Alexander Winton, head of the Winton Engine Works of Cleveland, with a number of San Francisco shipping concerns for the installation of Diesel electric drive in wooden hulls constructed as steamers by the U. S. Shipping Board but never completed.

The installation of the Diesel engines and electric drive promises completely to revolutionize the construction and operation of ocean freighters and probably passenger craft.

There are more than a score of Ferris type hulls completed and waiting for the installation of the machinery. These are distributed at various Pacific Coast ports.

The Westinghouse Electric Company and the Winton Company will supply the motors and electrical equipment. According to comparative figures as prepared by the engineers, the new type of ship power has a vast advantage over the steam boiler and triple expansion plant.

The figures follow:

Diesel Elec. Drive.	Triple Exp. Plant.
Indicated horsepower 1400	1400
Weight of plant installed ..... 220 tons	300 tons
Fuel used per hour per horsepower ..... 45 pounds	1.25 pounds
Fuel used per hour ..... 1.9 barrels	5.4 barrels
Fuel used per day in barrels at sea ..... 47.2 barrels	129.6 barrels
Fuel used per day in port ..... 8 barrels	25 barrels
Cost of fuel oil per barrel $1.85	$1.60
Cost of fuel per day at sea $87.32	$207.36
Cost of fuel per day in port $14.80	$41.60
Days at Sea 270	270
Days at sea 95	95
Water used per day for power plant	3.75 tons
Fuel used per day ..... 6.74 tons	18.64 tons
Weight of fuel carried ..... 220 tons	650 tons
Weight of water carried ..... 50 tons	170 tons
Cost of water per ton $1	$1
Cargo carried in dead-weight tons ..... 3400 tons	3000 tons
Earning power of ship D. W. T., one yr. $50	$50
Fuel used in year ..... 13,504 barrels	37,462 barrels
Water used in year for power plant	1,125 tons
Total cost of fuel and water for one yr. $24,983	$61,065
Profits of ship in one year $170,000	$150,000
Total net profits per year $145,017	$88,935

A unique feature of the new system is that the engines will be placed on the deck, aft, under the poop. Being placed directly over the twin motors which are geared to the propelller shaft, there will be only a short run of the insulated conduits, and the grave problem of adequate insulation has been easily solved.

Each of the engines will have eight cylinders, and having a high speed like that of an automobile, the twenty-four cylinders will cause but slight vibration. An extra athwartship bulkhead is to be placed under the engines as added support.

POWER AND IRRIGATION PLAN

An application to the State Water Commission to appropriate 2,000 second feet of the storm and surplus waters of the Kern River stream system for the purpose of developing the hydro power and for use in irrigation, was filed recently with the commission by the Kern Delta Irrigation District.

The proposed power dam is to cost $15,000,000 and will be built at the junction of the Kern river and its south fork, at Isabella, sixty miles northeast of Bakersfield. The dam will impound 1,500,000 acre feet of water and will generate 150,000 theoretical horsepower, according to the applicants for the water diversion permit.

EMPLOYES' CO-OPERATIVE STORE

The employes of the Westinghouse Electric & Manufacturing Company have opened a co-operative store where employes can buy provisions at cost.

The large storeroom or distribution depot has been secured at 709 Braddock Avenue, East Pittsburgh, Pa., just opposite the general offices of the East Pittsburgh works. At this distribution depot employes can purchase standard commodities such as flour, ham, bacon, coffee and canned goods. Other standard commodities will be added from time to time as the demand becomes evident.

This co-operative buying scheme is managed entirely by a committee of employes. The movement is endorsed by the management of the company, which has placed with the committee its facilities for placing orders with a standing credit where provisions can be purchased at the lowest cost. The co-operative buying will be done on the cash and carry basis, each person paying cash and carrying his purchase home.

While this plan has just been announced by the committee, it is meeting with general approval and will probably result in quite a saving to the employes taking advantage of it.

POWER PLAN IN NORTHWEST

The construction of two power plants along the Tumalo River at a cost of approximately $229,000, for the development of 4,225 horsepower, is contemplated by the Bend Water, Light & Power Company, which filed application with the State Engineer's office recently for permission to appropriate 50 second feet of water from Tumalo Creek.

According to plans submitted with the application, the company proposes to appropriate the water in two falls. One of the plants would be operated with water taken from the canal of the Tumalo irrigation district and the other from a canal to be constructed lower down the stream.

Inasmuch as the plan involves the appropriation of water already appropriated for irrigation purposes, the company proposes the construction of another irrigation canal, lower down the river, from which to supply land that would be deprived of water by reason of the connection of the power plant with the Tumalo irrigation canal. A contract embodying the phase of the project was presented to the State Land Board by the company some time ago and is still pending. Action by the State Engineer's office upon the power application depends upon the approval of the contract by the State Land Board.

LIGHTING SYSTEM DIFFICULTIES IN SAN FRANCISCO

The famous Market-street lighting system, known as the "Path of Gold," is in danger of being lost to San Francisco.

The Down Town Association in 1916 entered into an agreement with the Board of Supervisors and the gas company to install this wonderful system of street lighting, which has been one of the wonders of the West to travelers who have visited San Francisco. The system was installed and the Down Town Association undertook to collect subscriptions from the property owners and tenants on Market street for a period of three years to pay the cost, which amounted to approximately $24,000 a year, the United Railroads assuming a small portion of the expense of lighting of one of the lamps and the city the top light.

The contracts of the merchants and property owners on Market street having expired, an attempt was made to renew the contracts for another three-year period, as the investment of the Pacific Gas and Electric Company, which put up the molded standards, could not be repeated unless the lights were operated for at least ten years continuously.

The franchise of the city calls for one single light to be maintained by the street-car companies on Market street,

and it is practically certain that under the franchise with the two outer brackets closed the railroad companies would not feel obliged to assume the burden of keeping this high-powered light lit on the street; hence the gas company will be compelled to desert the entire "Path of Gold" system.

The association holds the funds merely as a trust, without profit, and, in fact, at a great expense to the association proper; and the lack of cooperation on the part of the property owners and tenants and the inability to make up the deficit in the rapidly dwindling amount of the finances of the lighting funds have forced the issue until it has appeared that there is no alternative but to turn out the lights and substitute the old-style system of lighting.

A canvass of every property owner, leaseholder and tenant of Market street is to be made by circular and solicitor, in an endeavor to secure a sufficient number of renewals of contracts to keep the lights burning.

IN HONOR OF MARCONI

A special fund for immediate work in relieving the distress of Italian war orphans, maimed soldiers and other war victims has been started under the auspices of the Italian War Relief Fund of America, to be known as the Marconi Fund for Italy, and a special committee has been appointed to represent the electrical interests of America. The committee consists of Elihu Thomson, John W. Lieb, and T. Commerford Martin.

It is hoped that $50,000 will be raised, and the fund is being confined primarily to those engaged in the electrical industries in America. Contributions should be sent to Mr. T. C. Martin, 29 West 39th St., chairman of the special fund.

REGISTRATION OF ENGINEERS

A committee of fifteen representative engineers from all parts of the United States formed under the Engineering Council has been giving careful study for many months to the matter of licensing or registering of engineers. A preliminary draft of a model law was circulated in manuscript for criticism. Up to this stage the committee's work was necessarily done by correspondence. October 13 to 17 the committee met in Chicago, and devoted five days and evenings to a thorough discussion of the information and comments collected, and the drafting of a revised form of the proposed model law. This revised draft has been submitted to the members of the committee for final consideration and editing. It is expected that the results of the committee's work will be presented to the Engineering Council at its December meeting, and that subsequently the model law can be made known to engineers throughout the country, through the publications of the societies and the technical journals. That well considered and uniform legislation is advisable, is shown by that fact that there is a steadily increasing demand in a number of States for the passage of some law to regulate the practice of engineering, and that eleven States have already enacted such laws, differing materially in their provisions. Seventeen States likewise have upon their statute books laws regulating the practice of architecture as a profession. Such legislation recently went into effect in Oregon. It was considered as a possibility at the last session of the California legislature, but was postponed until more unified support among the engineers would be assured.

TRADE NOTES

Western Representation —

R. C. W. Libbey, Western representative covering territory west of Denver for the Simplex Electric Manufacturing Company, is making an extended trip through the Northwest. He will in the future make his headquarters in San Francisco. Holbrook, Merrill & Stetson are so well pleased with results obtained in handling Simplex electric ranges and heaters that they have now arranged to act as distributors for the complete line of the Simplex Electric Manufacturing Company in California, Nevada and Arizona.

Export Shipment of Electric Furnace Equipments —

Electrical equipment for twenty electric furnaces, made by the Westinghouse Electric & Manufacturing Company, which, when placed in operation, will comprise the largest electric furnace installation ever made, is now being shipped from the United States to the Glomfjord Smeltverk Company, of Glomfjord, Norway.

District Offices Opened —

The recently incorporated Booth Electric Furnace Company has opened up the following district offices in connection with the sale of electric furnaces for melting steel, iron, and non-ferrous metals:

For New York and New England, Edward B. Stott & Co., Flatiron Building, New York City, with E. F. Tweedy, secretary of the company, directly in charge; for Eastern Pennsylvania, New Jersey, Maryland, Delaware, and Southern Atlantic Coast States, Northern Engineering Company, 308 Chestnut St., Philadelphia, with F. W. Doran in charge; for Northeastern Ohio, Western Pennsylvania, and Western New York State, Chas. L. Foster, formerly sales manager of the Electric Furnace Company, of Alliance, Ohio, with offices at 879 The Arcade, Cleveland, Ohio.

In connection with these district offices a complete staff of engineers and metallurgists will be maintained so that the needs of customers can be promptly met and adequately taken care of.

Western Branch Office —

L. A. Somers, for 21 years connected with the electrical industry in Canada and the United States, recently severed his connections with the Westinghouse Electric and Manufacturing Company and accepted a proposition to open an office in San Francisco for The McMyler-Interstate Company of Cleveland, Ohio.

The McMyler-Interstate Company is a merger of the McMyler Manufacturing Company and the Interstate Engineering Company. These two companies have an uninterrupted combined history of about 35 years in the manufacture of coal and ore handling machinery, locomotive cranes, ship building cranes, car dumpers, pile drivers, railroad equipment, clam shell, scraper and orange peel buckets.

Mr. Somers has specialized on the application of electric apparatus and steam turbines to shipyard practice.

The building of the famous electrically operated battleship "California," which was recently launched at the Mare Island Navy Yard, was facilitated by the use of two shipbuilding cranes of the Hammerhead type, built by The McMyler-Interstate Company.

Bulletins describing these cranes and other types of cranes this company manufactures will gladly be furnished on written request, addressed to the company's offices, 407-409 Merchants Exchange Building, San Francisco, California.

The McMyler-Interstate Company has contributed some noticeable examples to the art of the mechanical engineer, chief of which, perhaps, may be mentioned a 350 gross ton capacity fitting-out crane. This crane, which has a capacity of 392 net tons, is probably the largest capacity crane, of any description, which has ever been built. It is electrically operated and therefore possesses great interest for electrical as well as mechanical engineers. It is now being erected in the Philadelphia Navy Yard, at Philadelphia, Pa.

LATEST IN EVERYTHING ELECTRICAL

(An automatic electric range with a number of special features is one of the new items on the market to meet the steadily growing demand for electrical household equipment. A new reflector, a convenient attachment plug, and a warning light for a switch box are among other new industrial devices reviewed here.—The Editor.)

AN ELECTRIC RANGE

The automatic time control is one of the features of the new Hughes automatic electric range recently put on the market by the Edison Electric Appliance Company. The automatic time control is an electrically operated timing

This range is furnished with automatic time-control and temperature regulator which simplify cooking to a remarkable degree by practically eliminating supervision.

device that automatically turns current on and off at any hour desired. It is simple to use, requires no winding, as does a clock and is always ready for immediate use.

Another item of interest is the automatic temperature regulator—a thermostat that automatically maintains the heat of the oven at any desired cooking temperature indefinitely. The proper oven temperature at which to cook the food is determined first; then the regulator is set by means of a lever as shown on the instruction card which is permanently secured to the side splasher.

This regulator is one of the distinctive features of the new range and is in addition to the automatic feature which turns the current on and off.

The automatic temperature regulator prevents extravagance in current by supplying just enough heat to keep the oven at any desired temperature—it saves food because it prevents easy scorching or burning, and at the same time provides the particular temperature which is most suitable.

As the oven heats, the indicating pointer on an oven thermometer moves up the thermometer scale until it is opposite the adjustable pointer which designates the temperature to which the oven is to be heated. It then cuts the current off by means of the thermostat and just as soon as the indicating pointer drops below the adjustable pointer, the current is again automatically turned on. This continues until the time the current is set to turn off, so that an even temperature is maintained during the entire cooking operation. It keeps you informed as to how hot the oven is at any time. The thermometer responds quickly to fluctuations in oven temperature and shows actual temperature whether the oven is being heated or cooled. It is strictly a thermometer and accurately indicates temperature in degrees.

The automatic range can be used three different ways:

1. The automatic time control and temperature regulator are both set, giving full automatic control.

2. The temperature regulator only is used, the current being turned on and off by hand at the oven switches. In other words, the temperature regulator is set, the switches turned on by hand, and the indicating pointer moves up the scale and operates in the same manner as described above. This continues until the operator turns the current off by hand, at the switches.

3. The temperature regulator is used as a safety device only, both the current and temperature being controlled by hand. That is, the temperature regulator is set at the top of the scale, so that there is no possibility of overheating the oven. Should the operator forget to turn the current off, the thermostat would perform this function just as soon as the indicating pointer reached a position parallel to the temperature regulator.

NEW REFLECTOR

The National X-Ray Reflector Company of Chicago announce the production of a new X-Ray, silver-mirrored reflector—the X-Ray Tru Da reflector. These reflectors are blown of blue crystal glass, and give, for all practical purposes, a color-matching light wherever daylight is needed.

This reflector is placed on the market only after very extensive tests and experiments by the engineering department of the manufacturer.

The blue crystal reflector being the sole element in securing the white quality of the light, it became necessary

This portable light equipped with a special reflector is especially designed for stores to provide a color-matching light when daylight is not available.

to use the greatest care in selecting and introducing the correct color pigment into the manufacture of the reflector.

The first of the X-Ray products to use the blue crystal reflector is the Curtis X-Ray True Da light, designed especially for use in stores. This is a portable light, which stands 16¾ inches high, is finished in dull black only, and is designed for placing on show cases and tables.

True Da lights require no colored lamps or diffusing plates; the clear white light is secured through the use of the X-Ray True Da reflector. They are economical in current, requiring only a 25-watt, round bulb, frosted Mazda lamp, and are supplied complete with lamp, 8 feet of cord, plug and switch ready to use.

NEW SWIVEL PLUG

A new swivel attachment plug has been developed in the Specialty Department of the Cutler-Hammer Manufacturing Company, Milwaukee, Wis. The design of this new plug is

A plug which is so constructed that it can be very simply wired, and will not come apart when unscrewed from the socket.

such that several distinct advantages are provided. It is shipped complete assembled and need not be taken apart in order to wire. The work of attaching these plugs is further reduced because there are no binding screws to loosen and untighten. In fact, no screws are used in the construction.

It consists of an inner and outer member which revolve on each other. The wires are connected to the inner member, while the outer member comprises the ordinary screw shell and a knurled head made of heat-proof molded insulation. In wiring two wires are stripped an equal length, about three-eighths of an inch; one is pushed into a center opening of the inner member and the other through any one of four concentric openings of the same number. By means of a stationary soldering iron, one wire is sweated in the center opening, while the other, after being turned over into a groove on the inner member, is soldered to it.

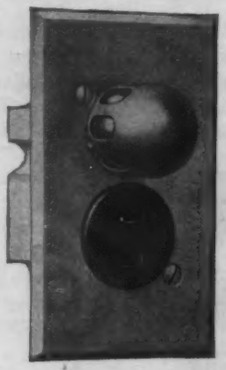
After being attached to a cord there is no possibility of the parts becoming separated when being unscrewed from a socket. This is a very desirable feature when the plug is used under a small shade or where a good grip on the plug cannot be secured. This new plug when shipped to the electric appliance manufacturer, reaches him in one complete piece. It cannot become dissembled nor a portion lost in shipment or in distribution. Trouble and losses due to difference in the number of the component parts on hand are thus avoided.

WARNING LIGHT FOR SINGLE SWITCH BOX

It is a recommendation of the National Electrical Code that in connection with smoothing irons, sad irons and other heating devices that are intended to be applied to combustible articles, there should be a warning signal to indicate that the current is flowing. Compliance with this recommendation has been rather slow because of the nature of the fittings that were available for the purpose. These were expensive in first cost and were also expensive to install, because of their size; some of them requiring a two-bang box, but most of them a three-gang box.

The Bryant Electric Company of Bridgeport, Conn., have just placed on the market a device which is a combination of their standard Spartan flush receptacle and warning light. The two are combined in a single porcelain which can be installed in a single switch box. The Spartan receptacle will receive any of the numerous Spartan and other standard parallel bladed caps. The 2-candle power, 125-volt, candelabra base warning lamp, which is connected in parallel with the receptacle, is protected from mechanical injury by a perforated brass cage. When occasion requires the lamp can be renewed by simply removing the face plate of the device. The connection in the receptacle are such that the lamp automatically lights up when the attachment plug cap is inserted, thus doing away with the necessity of a snap switch which is frequently a component part of devices designed for the purpose.

The use of a device of this kind is not only advisable from the fire prevention standpoint but also from the stand-



A flush receptacle and warning light combined for a single switch box, the bulb lighting up when the attachment plug cap is inserted.

point of economy in connection with the less hazardous but widely used domestic appliances such as percolators, toasters, chafing dishes, curling irons, etc., since it tends to diminish the unintentional and undiscovered consumption of current. All internal connections are made complete at the factory so that the device can be substituted for any receptacle at present installed, by simply attaching the line wires to the two terminals that are provided. This device, designated by catalog number 121, is equally advantageous in new installations in place of the ordinary type of receptacle.

NEW METHOD OF PACKING MAZDA LAMPS

After considerable experimentation and testing, the Westinghouse Lamp Company has determined upon a new packing method for its incandescent lamps. This new packing is now being used for a large proportion of the shipments made from its factories.

In the past the regular Mazda lamps have been simply inserted in a corrugated paper sleeve, and then placed in five-lamp cartons. Hereafter the use of the five-lamp carton will be discontinued. The lamps will be individually wrapped in attractive wrappers, the ends of which are tucked in so as to completely protect the tip of the lamp and at the same time serve as a cushion for the lamp itself. The individually wrapped lamps are then packed in a heavy cardboard tray.

As the well-known orange-and-black design of the Westinghouse Mazda Lamp carton will be used on the new wrapper as well as the trays, the new packing will look just as familiar to customers as the old carton design, which has been so extensively advertised.

In addition to the better protection of lamps afforded by the new packing, it also makes easier the handling, packing and reshipping of lamps by distributors and agents. No excelsior is needed in the new packing. Comparative shipping tests show that it is far superior to the old style packing in every respect.

The index for volume 43 of the Journal of Electricity, covering issues from July 1st to Dec. 15, 1919, is now ready, and will be forwarded to any subscriber on request.

NEW ELECTRICAL DEVELOPMENT

(Electrification of mines and large industrial plants is a feature of the news from the Pacific Northwest. Progress on various important power and irrigation projects is reported in the Pacific Central district, while in both the Pacific Southwest and the Intermountain district bids are being received in connection with extensive plans for agricultural, industrial and municipal development.—The Editor.)

THE PACIFIC NORTHWEST

HOQUIAM, WASH.—Sufficient signatures for petitions for curb lights on city streets have been obtained to guarantee installation.

TACOMA, WASH.—Commissioner Ira S. Davisson of the Light and Water Department, Tacoma, received bids on December 10 for $20,000 worth of electric ranges.

SEATTLE, WASH.—Recommendation that a permit be issued to the city to develop the water power resources of the Skagit River will be made to the Secretary of Argiculture by George H. Cecil, District Forester, Portland.

PORTLAND, ORE.—The North Portland Box Company's plant, destroyed in a recent fire with a loss of $25,000, will rebuild at once. Machinery will be electrically operated. Coast Steel & Machinery Company of Portland has contract for a considerable portion of the machinery.

DALLAS, ORE.—Dallas Machine & Locomotive Works have been organized by Carl F. Gerlinger, R. L. Chapman and W. G. Vassail, with capital stock of $35,000 and will engage in construction, erection and repair of machinery, engines, motors, locomotives and foundry products.

BAKER, ORE. — J. K. Romig and J. R. Romig, Jr. have filed an application with the State Engineer for appropriation of 25 second feet of water from Eagle Creek. A 2½ mile pipe line is contemplated with other improvements to cost about $300,000. The intention is to develop 700 horsepower for mining purposes.

SEATTLE, WASH.—The Grays Harbor Commercial Company, Cosmopolis, Washington, which now operates one 750 kilowatt generator unit, is installing another unit of the same capacity for meeting additional power requirements for the next year. The company manufactures staves for wood pipe, tanks, silos and boxes.

SEATTLE, WASH.—The North Bend Lumber Company has brought suit against the city of Seattle in the sum of $401,629.02 as compensation for destruction on December 23, 1918, of lumber mills, machinery and dwelling houses, alleged to have been flooded and swept away by reason of seepage through the north bank of the reservoir behind the city's Cedar River dam.

SEATTLE, WASH.—Superintendent of Utilities Thomas F. Murphine of Seattle states that if the unusual congestion on the downtown streets of the city is to be avoided, the street car terminal must be located at the north end of the business district. He states that over $1,000 a day is being lost by running all cars down First, Second and Third avenues to Jackson Street.

SEATTLE, WASH.—State Supreme Court has rendered a decision permitting city to sell below par $790,000 5 per cent street railway bonds and $1,250,000 lighting department bonds. It is possible at expiration of thirty days to dispose of the bonds and begin erection of an addition to the Lake Union auxiliary light plant. Contemplated extensions to municipal car lines are also made possible.

MORRISTOWN, WASH.—According to B. W. Lyon, representative of the Peabody Coal Company, of Illinois, recently arriving in Seattle to become manager of the Jafet-Lindeberg mines in this place, says the property is to be developed into a large producer. These mines now produce 250 tons a day and this is to be increased to 1,500 tons. Electrification is to be started at once and new washing and cleaning machinery will be installed at a cost of about $15,000.

SEATTLE, WASH.—The City Council failed to pass over the veto of the Mayor, a bill appropriating $14,000 for repaving East Union Street from Twenty-ninth to Thirty-fourth Streets, the amount to be taken from the city railway fund. The matter involves the possibility of a raise in street car fare by the city lines. It is claimed that to do all the paving that would fall to the municipal lines would cost $500,000 and that the city system could not pay this without a raise in the fares to six cents.

SPOKANE, WASH.—Two hundred men, employed in the light and power plants of the Washington Water Power Company, have been granted wage increases averaging 13 per cent and totaling approximately $40,000 a year, according to W. E. Coman, general manager. "This increase is made on account of the abnormal cost of living," said Mr. Coman. "Some of our lower-paid employees were given a slightly larger proportionate increase than the higher-paid men, with the view of giving all a good living wage."

CHEHALIS, WASH.—The North Coast Power Company has filed with the Public Service Commission of Washington tariffs covering power and residential lighting current, showing increase of rates amounting in some instances to 100 per cent. The company furnishes electric service to Centralia, Chehalis, Tenino, Bucoda, Kelso and Kalama. For supplying current to municipal distributing plants, the company establishes a minimum ready-to-serve charge of $600 a month for Chehalis, and $1,000 a month for Centralia.

SALEM, ORE.—The Bend Water, Light & Power Company contemplates construction of two power plants, one on the Tumalo River at a cost of approximately $230,000, to develop 5,225 theoretical horsepower. The conveyance of water through the Tumalo Irrigation Canal and the development of power by means of two plants on Tumalo Creek under a total head of 745 feet are contemplated. The construction of two pipe lines about three miles long will be necessary, also the construction of power houses and other buildings.

SEATTLE, WASH.—Sealed proposals will be received by the Board of Public Works up to 10 a.m. December 26, County-City Building, for furnishing the city lighting department with all the steel completely fabricated for a pipe line 78 inches (inside diameter), delivery to f.o.b. Cedar Falls. Amount of surety bond that successful bidder will be required to file with the City Comptroller will be 50 per cent of the contract price. Sealed proposals will also be received by the Board of Public Works up to December 19 for furnishing the city lighting department with four 5,667 kva. oil, insulated, water cooled transformers complete with accessories and oil, f.o.b. cars at Seattle.

PORTLAND, ORE.—Sealed bids for the erection of two double-leaf trunnion bascule bridges with their approaches and appurtenant works on Columbia River highway across Young's Bay near Astoria, Oregon, will be received by State Highway Commission of Oregon, Room 520 Multnomah County Court House, Portland, up to December 20, 1919, at 10 a. m. Included in the equipment will be large quantities of structural and reinforcing steel, machinery, necessary accessories (pumps, motors, signal lights, etc.), electrical equipment. Plans may be obtained at the office of the State Highway Commission and State Highway Engineer, State House, Salem, Oregon. Certified check or cash bidder's bond for an amount equal to at least 5 per cent of the total amount of bid for constructing bridge required.

THE PACIFIC CENTRAL DISTRICT

MERCED, CAL.—The Merced Irrigation District, to cost $5,000,000, is to be formed. The district comprises 173,000 acres.

SUSANVILLE, CAL.—Judge Moncur has adjudged the Baxter Creek Irrigation District bonds as invalid. C. S. Bond filed suit against the district.

MADERA, CAL.—Petition to establish the Madera Irrigation District, to comprise more than 300,000 acres, was passed by the Board of Supervisors, with no dissenting votes. The petition was referred to the State Engineer as required by law.

HONCUT, CAL.—The directors of the Honcut-Yuba Irrigation District have organized by electing H. S. Munson, chairman, and C. N. Hill, secretary. V. P. McCray and Frank S. McCray were appointed engineers. Surveying for the preparation of plans and specifications for the irrigation district will commence without delay.

FRESNO, CAL.—The San Joaquin Light & Power Corporation, operating in Central California counties, made application to the State Railroad Commission for authority to continue in effect the Commission's order made last January granting a 5 per cent surcharge of its rates. The date set for the expiration of the order is January 15, 1920. The company said in its application that the surcharge had failed to produce the estimated increase in revenue and asked the Commission to make such changes in the company's base rate as will provide relief.

RICHMOND, CAL.—The Pacific Insulating & Refrigerating Company, which has already purchased a site and one large building, will begin operations after the first of the year, adding to this city a place that will rank among the larger ones here. The manufacturing corporation paid $75,000 for the property and has arranged to acquire some more land adjoining the site. It will erect another building the size of the one purchased. It is probable that one large item for the new plant will be the supplying of insulated pipe and refrigeration for ships being constructed.

REDDING, CAL.—According to the plans and specifications as being drawn by the Pacific Gas & Electric Company engineers, the first unit of their contemplated hydroelectric power development at Big Bend will call for an expenditure of $10,000,000 in two and a half years. The company has at present twenty-five men building outhouses and running preliminary surveys. Engineer Downing says there is no doubt but what Pit River is the largest hydroelectric power stream undeveloped in the State of California. He says his company is planning for future development of many power sites on Pit River.

SANGER, CAL.—At the regular meeting of the City Trustees the ordinance providing for the installation of an electrolier system in the

business section of Sanger was given its final reading and was passed.

CHICO, CAL.—Extension of the Sutter-Butte Canal Company's lines south from Live Oak to a district east of District 1,500, Sutter County, is now under way. The improvements are in charge of J. L. Tullock, of Gridley, manager of the concern, and will cost $15,000.

MARTINEZ, CAL.—An election will be held in Ridge Land Irrigation District No. 2,036 on December 16, at which there will be submitted to owners of land in the district the question of whether or not the bonds of the district shall be issued in the amount of $256,940.

CHICO, CAL.—Plans for the installation of an improved lighting system in the annexed section of Chico have been prepared by the Pacific Gas & Electric Company and will be presented for approval by the Trustees at their next meeting.

SACRAMENTO, CAL.—State Engineer W. F. McClure announced that he has investigated and will report favorably on the irrigation project of the Fall River Valley District in Shasta County, where it is proposed to water 16,000 acres. The water supply from Fall River is ample, McClure said.

FRESNO, CAL.—By a resolution adopted, the Board of Supervisors approved the sufficiency of the petition for the formation of the Riverdale Irrigation District. The matter now goes to the County Engineer's office for the engineering details, after which another hearing will be held on March 1 to establish the boundaries of the proposed district.

TURLOCK, CAL.—The total amount of the bond issue to be asked for by Turlock Irrigation District in connection with the Don Pedro project is $4,108,000, divided as follows: Dam construction, $2,570,000; power plant, $420,000; transmission substations and distributing lines, $608,000, with an additional $510,000 for the improvement of canals and construction of additional drainage ditches.

WOODLAND, CAL.—George F. Cokeley, of Woodland, has applied to the Railroad Commission for authority to enter the public utility field as a distributor of water for irrigation purposes. He plans the construction of a dam to cost $110,000 to impound the waters of Panoche and Silver creeks, Fresno County. Cokeley is the owner of the Belmore or Chaney ranch of 6,720 acres in Fresno County.

TAYLORSVILLE, CAL.—The Feather River Company has ordered electrical equipment, a large compressor and other machinery for its Snowstorm group, adjoining the properties of the Engels Copper Company. The main working tunnel is in 250 feet and arrangements have been made for delivery of electric power to the property. The company is composed of Arizona copper men, headed by George W. Long, of Phoenix.

RICHMOND, CAL.—The Pacific Sanitary Manufacturing Company will shortly install an additional 50 horsepower in motors and the Metals Atomizing Company (a new concern) will start operations with one 100 hp. unit. Both will be served by the Richmond division of the Western States Gas & Electric Company. The second named company will add other units later. A new oil tank company building at Point Orient will require 25 horsepower in motors.

BAKERSFIELD, CAL.—An application to the State Water Commission to appropriate 2,000 second feet of the storm and surplus waters of the Kern River stream system for the purpose of developing the hydro power and for use in irrigation was filed with the Commission by Kern Delta Irrigation District, according to advices reaching Bakersfield. The proposed power dam is to cost $15,000,000 and will be built at the junction of the Kern River and its south fork, at Isabella, sixty miles northeast of Bakersfield.

SAN FRANCISCO, CAL.—For the completion of irrigation and reclamation projects in the West an appropriation of $50,000,000 is being sought by the recently organized Western States Reclamation Association, according to an announcement made by Charles H. Lee, of the State Water Commission. Superior California waterways come in for liberal appropriations for the next fiscal year. This is according to the estimates submitted to Congress by the Secretary of the Treasury. Among them are: Richmond Harbor, $200,000; San Pablo Bay, $103,400; Petaluma Creek, $14,500; Humboldt Harbor and Bay, $706,000; Mokelumne River, $1,500; Sacramento River, $75,000. Appropriations for buoys and lights and daymarks are asked as follows: Point Buchon and Fort Rose, $10,000; Crescent City, $4,500; Suisun Bay, $2,500; Lake Tahoe, $10,250. For the maintenance of dikes and dredging, underground electrical wiring system and paving at Mare Island Navy Yard, $175,000. The recommendation for the Orland Irrigation project calls for $120,000, and the Klamath project in California and Oregon for $289,000. Indian appropriations asked for Superior California are: Fort Bidwell Indian School, $29,000; road from Hoopa to Weitchpec, $10,500; and for the irrigation of the Hoopa Valley Reservation, $85,000.

THE PACIFIC SOUTHWEST

PHOENIX, ARIZ.—Bids for the completion of work on the Lyman dam, near St. Johns on the Little Colorado River in Apache County, will be called for shortly.

VENTURA, CAL.—Sealed bids were received by the City Clerk up to December 8, 1919, for construction and installation of twenty-two ornamental concrete street lights.

PASADENA, CAL.—A bond issue of between $4,500,000 and $5,000,000 will be asked for the struction of the Municipal Railway, according to a statement made by Commissioner John J. Hamilton.

SAN JACINTO, CAL.—The Coachella Valley Storm Water Board let the contract for erecting a spreading dam in Whitewater River wash near Palm Springs Station to Louis Ferrill, of Pomona. Contract price, $15,865.

REDLANDS, CAL.—The Chamber of Commerce has approved a plan for organization under the new State law of a water conservation district composed of Orange, Riverside and San Bernardino counties, and steps will be taken soon to complete the organization of the district, which will seek development of additional water conservation of supply and flood water protection in the Santa Ana River basin.

FILLMORE, CAL.—The Sespe Light & Power engineers are here engaged in locating sites for dams and a big power plant. Frank Lock is the local engineer of the company. Big Sespe Oil Company's field will also be located.

CASA GRANDE, ARIZ.—W. H. Reed, Chief Engineer, United States Indian Reclamation Service, recommended that $150,000 more be appropriated to aid the construction of the dam, with bridge superstructure near Sacaton, and $75,000 be granted to apply towards aiding construction of the diversion dam above Florence.

THE INTER-MOUNTAIN DISTRICT

PUEBLO, COLO.—A new tract of one thousand acres of land north of Fowler, Colorado, will be irrigated by electric power next year, if plans under way mature. This will give the Arkansas Valley Railway, Light & Power Company an additional 150 horsepower of irrigation business. The company's output is running 15 per cent ahead of last year. Striking steel employees are anxious to return to work and the coal strike situation is gradually clearing. Neither of the strikes have affected the company materially and conditions in general are reported good. Eight electric household appliances were sold by the company during the week ended November 7. A new station will be constructed at Pueblo, Colorado, on the present power house site of the Arkansas Valley Railway, Light & Power Company. The present power station, with a capacity of 7,500 horsepower, will be maintained and the new station with a present capacity of 10,000 horsepower will be constructed adjacent to it. This improvement, like the others, is necessary because of increasing business in present territory and not because of expansion of territory.

PLUMMER, IDA.—The village of Plummer, Idaho, will receive sealed bids for the construction of an electric line, and furnishing all material for the construction of such line, in the townsite of Plummer, Idaho.

BOISE, IDA.—Challis is assured a hydroelectric power plant, the State Public Utilities Commission having granted to W. W. Adamson proper authority to begin work and ordered him to begin construction of his plant and system within sixty days, and to keep a full, accurate and detailed account of all costs and expenditures in connection with the construction of the plant and system, filing the same with the Commission within thirty days after service is begun.

BUHL, IDA.—James J. Chambers, of Denver, Colorado, who owns power rights in Sand Springs north of Riverside Ferry, and H. E. Lindon, engineer of the firm of Beckman & Linden, San Francisco, met with the citizens of this place recently to discuss the proposition of furnishing water to this city from Sand Springs. Chambers stated that if the city would vote bonds for a water system and a municipal lighting and heating system, his company will supply water and current and take compensation in municipal bonds.

ST. ANTHONY, IDA.—Contracts for wiring two buildings at the State Industrial School, this place, was awarded to Pope Electric Company ,Boise, at $1,400.

SALT LAKE CITY, UTAH—Business men of Sugar House, a suburban business district of this city, have petitioned the City Commission for permission to erect at the principal intersection of their business district a large electric sign in the form of a star with a suitable slogan directing attention to their locality as a shopping center. The sign will be 14 feet in diameter and suspended over the street intersection and is evidence of the value of this type of advertising in promoting a live "community spirit."

SALT LAKE CITY, UTAH—The Public Utilities Commission of this State is now considering the application of the Utah Gas & Coke Company for an increase in rates. The valuation of the property is set at $3,250,777, on which the company asks for 8 per cent return. The increase, if granted, amounts to approximately 44 per cent over present rates.

TREMONTON, UTAH—The new street lighting system in the residence district of this city was put in operation for the first time on November 28. The "White Way" lighting for Main Street will be ready within a short time.

DELTA, UTAH—In answer to a recent complaint filed with the Public Utilities Commission as to poor service rendered by the People's Telephone Company, that company has made formal application to the Commission for an increase in rates, stating that it is impossible to furnish adequate service under present rates. Hearing has been set for December 17.

BRIGHAM CITY, UTAH—Mayor J. W. Peters officially closed the switch at 6 o'clock on the evening of December 1, which threw into operation the city's new electric lighting system and the "Great White Way" became a reality. There are forty-six lights of 600 candlepower each, or three and one-half times the candlepower under the old system. The system is the constant current series type with the George Cutter suburban post, Sollux, Jr., globe. The lamps are spaced 132 feet apart. The total cost of the system amounts to $13,000.

GUARD YOUR INSTALLATIONS *with* "V.V." SAFETY SWITCHES

Here are the Four Types of

V. V. Safety Switches

FOR YOUR INSTALLATIONS

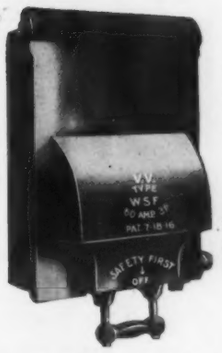
A type for every class of wiring construction. All of high-grade manufacture, with positive Make and Break operation to insure absolute safety and long life.

TYPE "SF" WEATHER-PROOF

Type SF—For high-grade installations—Made in 30 and 60 ampere, 2 and 3 pole sizes, for 125 and 250 volt.

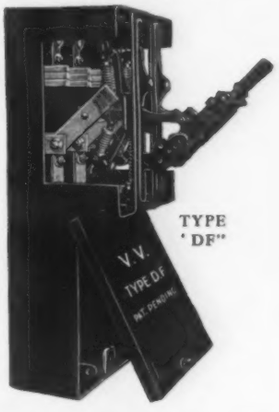
TYPE "CSF"

Type CSF—For low price installations—Made in 30, 60 and 100 ampere sizes, 2, 3 and 4 pole, 125, 250 and 500 volt.



TYPE "WSF" WEATHER-PROOF

Type WSF—For high-grade, weatherproof installations—Made in 30, 60 and 100 ampere sizes, 2, 3 and 4 pole, for 125, 250 and 1,500 volt.



TYPE "DF"

Type DF—Quick Make and Quick Break Safety Switch—Made in 30 to 1000 ampere sizes, 2, 3 and 4 pole, for 125, 250, 500 and 600 volt circuits.

Write for the NEW SAFETY SWITCH BULLETIN—Just Issued

BAKER-JOSLYN COMPANY

LOS ANGELES — V. V. PACIFIC COAST DISTRIBUTORS — SEATTLE

SAN FRANCISCO, -:- CALIFORNIA

A Hundred Thousand!
Nine Million!
Fourteen Million!

One Hundred Thousand Farm Lighting Plants—Nine Million Homes wired but for the most part in need of rewiring and refixturing—Fourteen Million Homes unwired, to say nothing of new buildings and the opportunities in industrial work of every kind!

There will be a big demand for electrical supplies—the Electrical Jobber is ready to meet it.

Careful selection of stocks—warehouses located right next to the greatest activities in development—familiarity with the needs of the territory covered assure you of reliable material, large assortments, quick deliveries.

Concentrate on the Jobber for the supplies you will need to hold up your end of the Big Business that is coming your way.

ELECTRICAL SUPPLY JOBBERS ASSOCIATION

Office of the Secretary
411 SOUTH CLINTON ST., CHICAGO

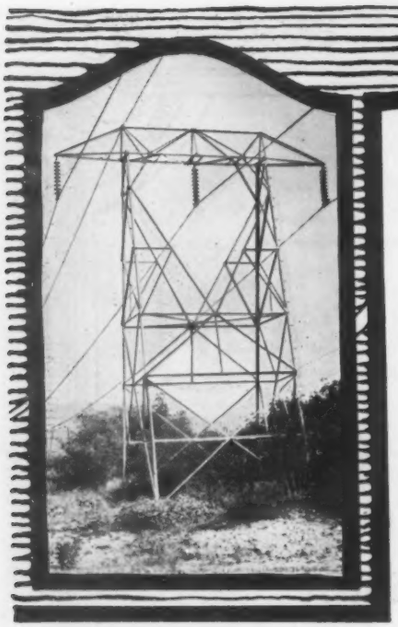
THE highest attainment in life--in art--in business is simplicity.

Simplicity is nothing more nor less than applied common sense.

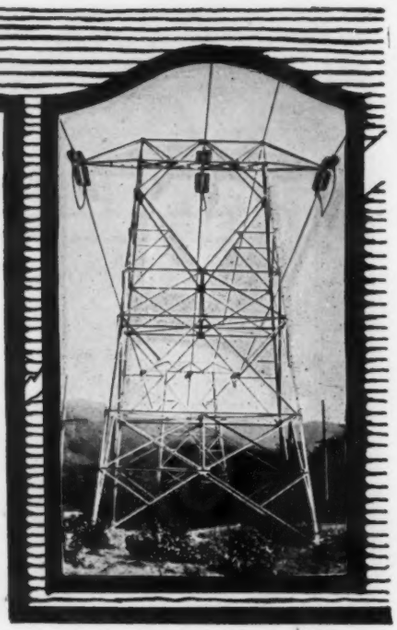
Pacific States service is the application of common sense to the simple, the obvious thing.

Pacific States Electric Company

Los Angeles Oakland Portland San Francisco Seattle Spokane



Two views showing Locke Suspension Insulators, 2565-P, in use on the Big Creek Transmission Line (150,000 volts) of the Southern California Edison Company



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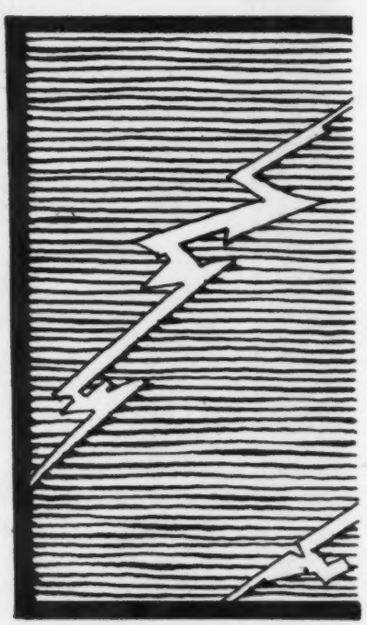
Victor Insulators provide ample safety factors for the most severe requirements. Specify them.

Ample stocks are carried in all our warehouses.



The Locke Insulator Mfg. Co.

Victor, N. Y.

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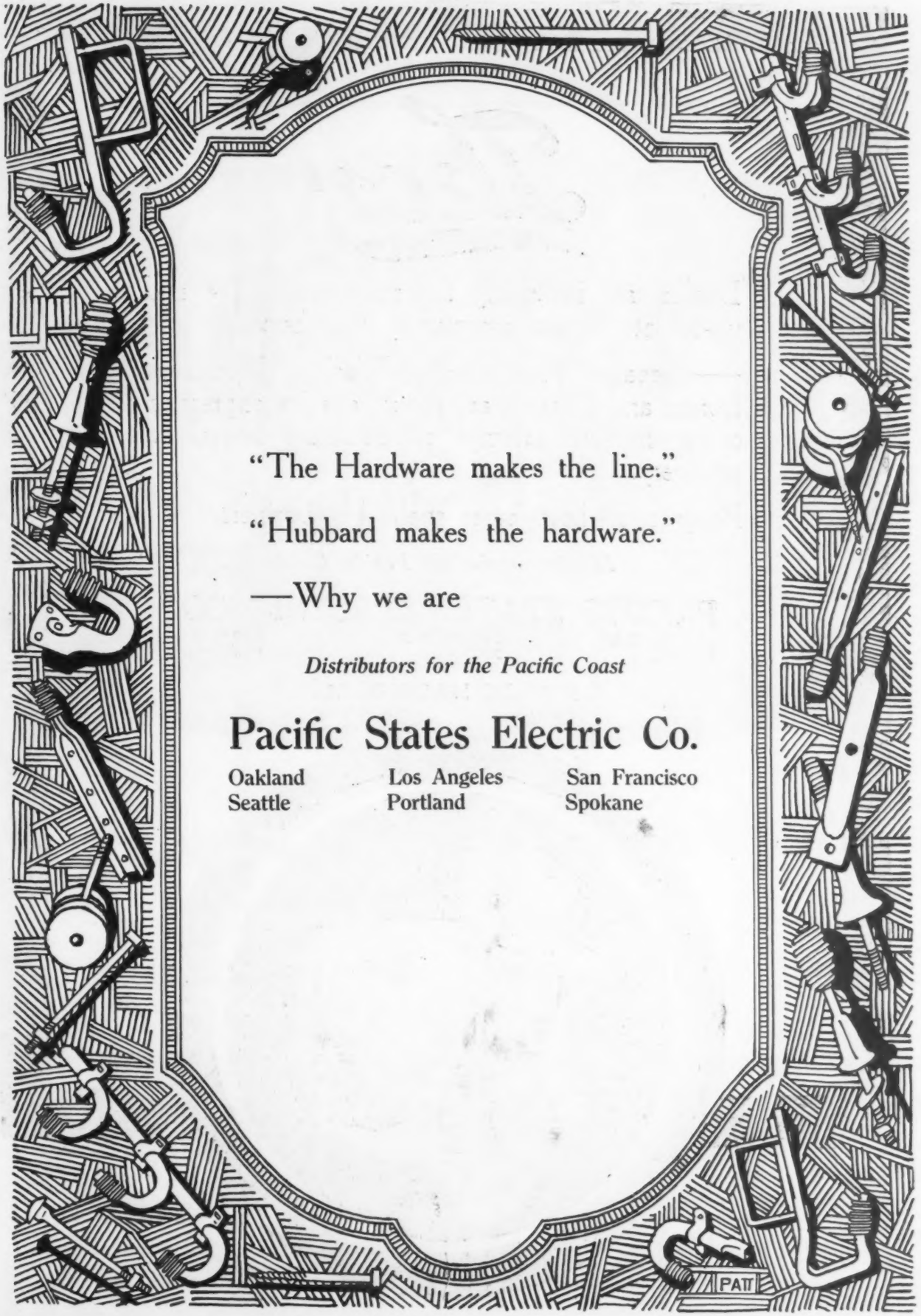
"The Hardware makes the line."
"Hubbard makes the hardware."
—Why we are
Distributors for the Pacific Coast
Pacific States Electric Co.
Oakland Los Angeles San Francisco
Seattle Portland Spokane
PATT

Thor

Dealers are invariably the most progressive and up-to-date in the community they serve.

——because Thor Electric Washing Machines, Ironers and Cleaners are the superlative expression of a modern attempt to eliminate household drudgery.

Progress in both cases spells big business.

Distributors for the Pacific Coast

PACIFIC STATES ELECTRIC CO.

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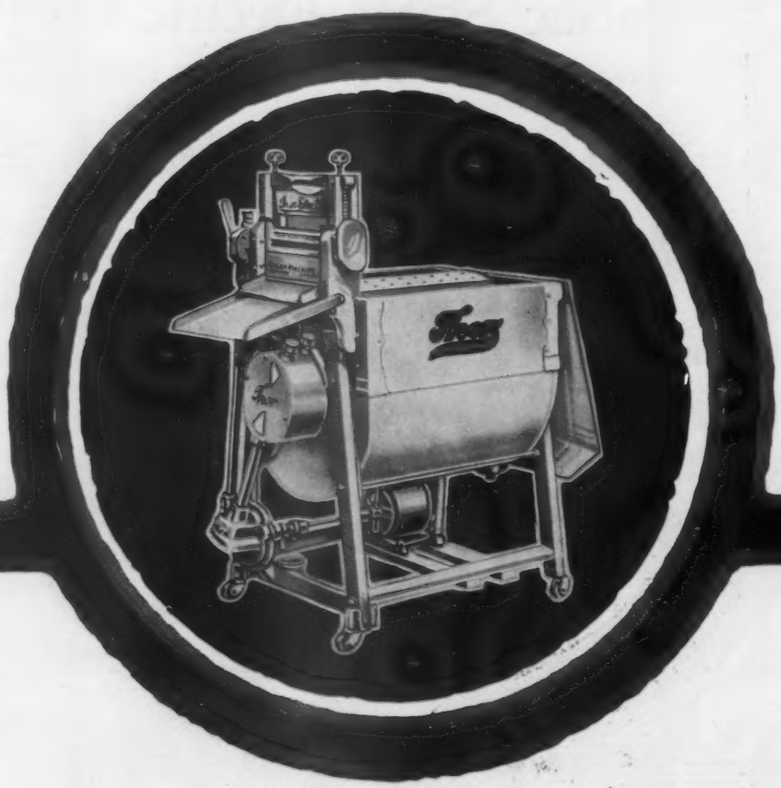
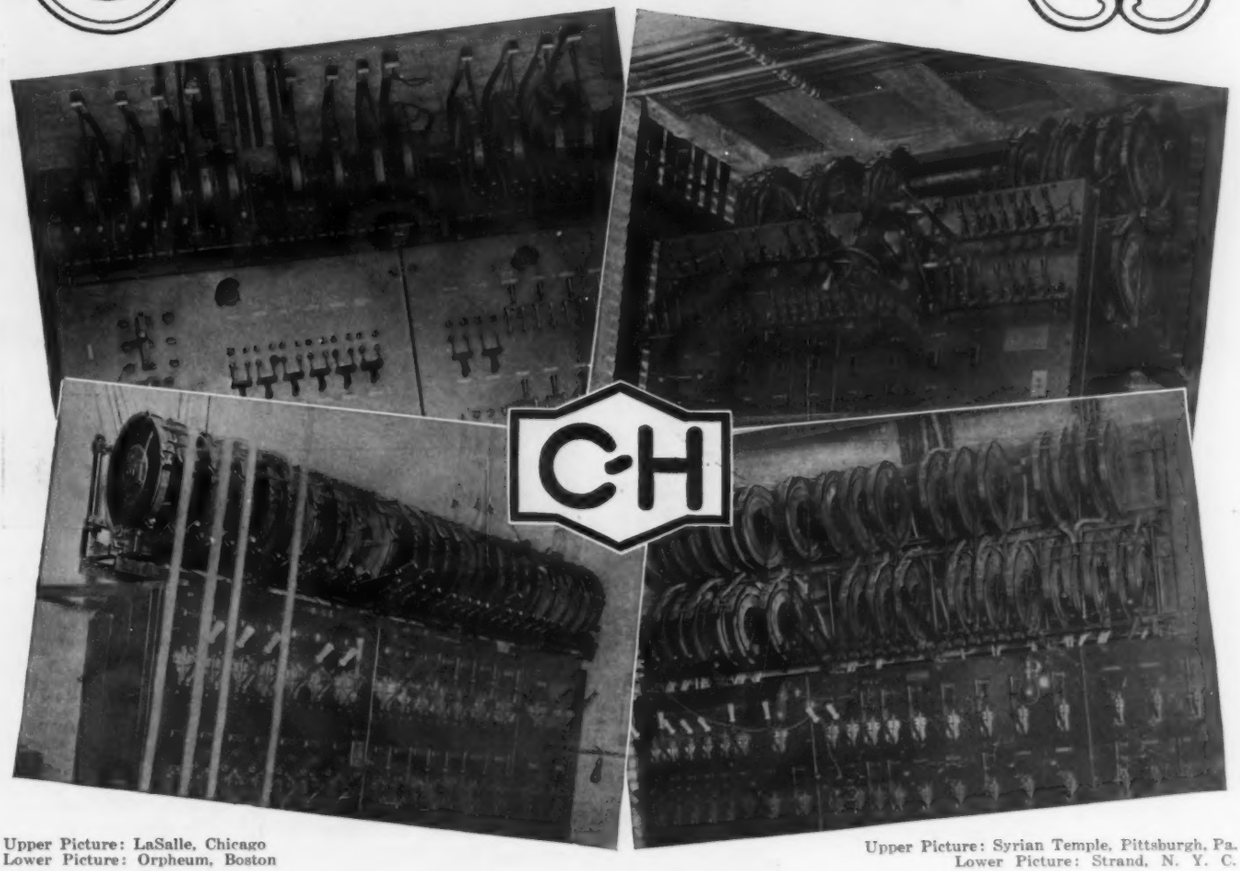


THEATER DIMMERS



Upper Picture: LaSalle, Chicago
Lower Picture: Orpheum, Boston

Upper Picture: Syrian Temple, Pittsburgh, Pa.
Lower Picture: Strand, N. Y. C.

Care for Your Theater Dimmer Business—*Now*

By taking up the matter of dimmers for theaters now with the engineers in any of our district offices, you will be able to arrange for the proper amount of space to accommodate a bank of dimmers to give the best possible effects. Drop a line for a copy of our new booklet-- "Theater Dimmers," Publication No. 445.

The Cutler-Hammer Mfg. Co.

Works: Milwaukee and New York

Pacific Coast Agents: H. B. SQUIRES CO., San Francisco, 583 Howard St.
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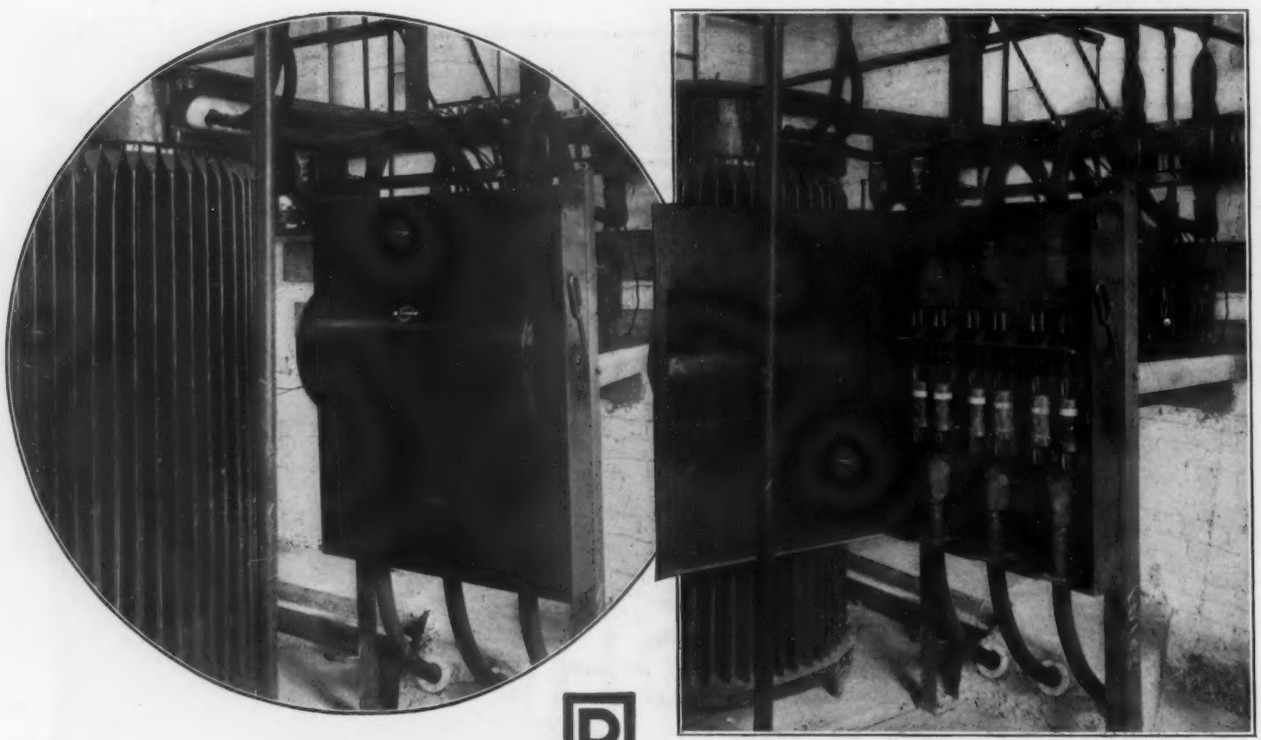

This 1200 Ampere Switch is SAFE

The Square D Switch above carries a current of 1200 amperes, yet anyone can operate it, or work near it, safely. It is the big brother in a complete line of Safety Switches, 300 sizes and styles for every light and power circuit in factory, office-building and home.

There are sure to be a lot of calls for Safety Switches, and the Square D line will meet every call. It is a big opportunity for the dealer or contractor that gets ready for the business early in the game. We do our best to make our switches sell easily — we put out good switches at a reasonable price, advertise them all over the country, and we offer you a liberal profit. Square D Switches are listed as standard for both fire and accident prevention by the Underwriters' Laboratories of the National Board of Fire Underwriters. Thousands of large and small firms already use them, and many more thousands will.

Here is a chance for you to do a bigger and more profitable business. Send in your name and address — give us the opportunity of convincing you that the chance is real.

SQUARE D COMPANY

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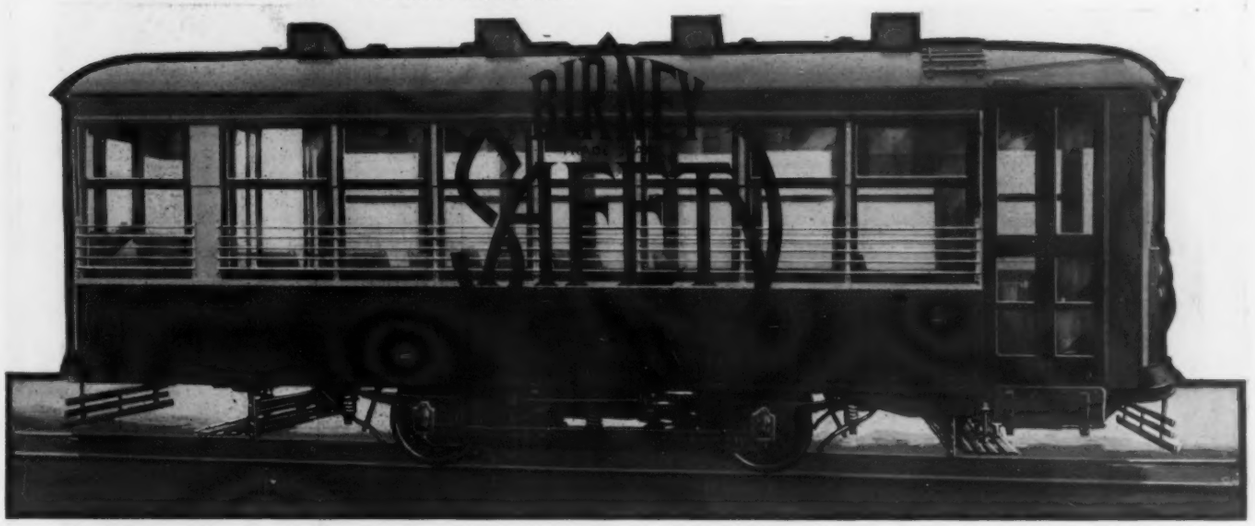
Canadian Works: Walkerville, Ont.

New York Chicago Philadelphia Pittsburgh St. Louis San Francisco Atlanta Toronto, Ont. Portland, Ore.

Square D Safety Switch

Behind This Trade Mark —



The Birney Safety Car

is representative of the combined efforts of its originator, Mr. C. O. Birney and the builder.

Behind the "Birney Safety Car" is the experience of the entire Brill organization. The American Car Company's Plant, specially assigned to its exclusive output, is recognized as the home of Birney Safeties. It built those installed at Fort Worth, has built and is building them for cities in every section of the country.

Its installation permits railways to withstand the ravages of high material and labor costs.

Money saved in operating and maintenance expense plus increased earnings through more service and acquired public good-will is responsible for its general adoption.

Learn more about the "Car behind the Trade Mark" by sending your inquiry to the "Organization behind the Car." Address-

THE J. G. BRILL COMPANY

Philadelphia, Pa.

AMERICAN CAR CO.
St. Louis, Mo.

G. C. KUHLMAN CAR CO.
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WASON MANUFACTURING COMPANY
Springfield, Mass.

Both Appreciate the Advantages of R & M Motor Equipment

The superintendent of the factory which makes electric-driven devices likes the R & M Motor because the motors supplied him are perfectly adapted to his product. His manufacturing problems are simplified and the efficiency of his product is increased.

And the sales manager likes the R & M Motor in the product he has to sell because R & M Reliability holds business for him and reduces selling expense. He finds too, that the name Robbins & Myers used in connection with his device creates added prestige for his goods. For many years of dominant advertising in the leading general magazines has made R & M Quality something which is generally known everywhere.

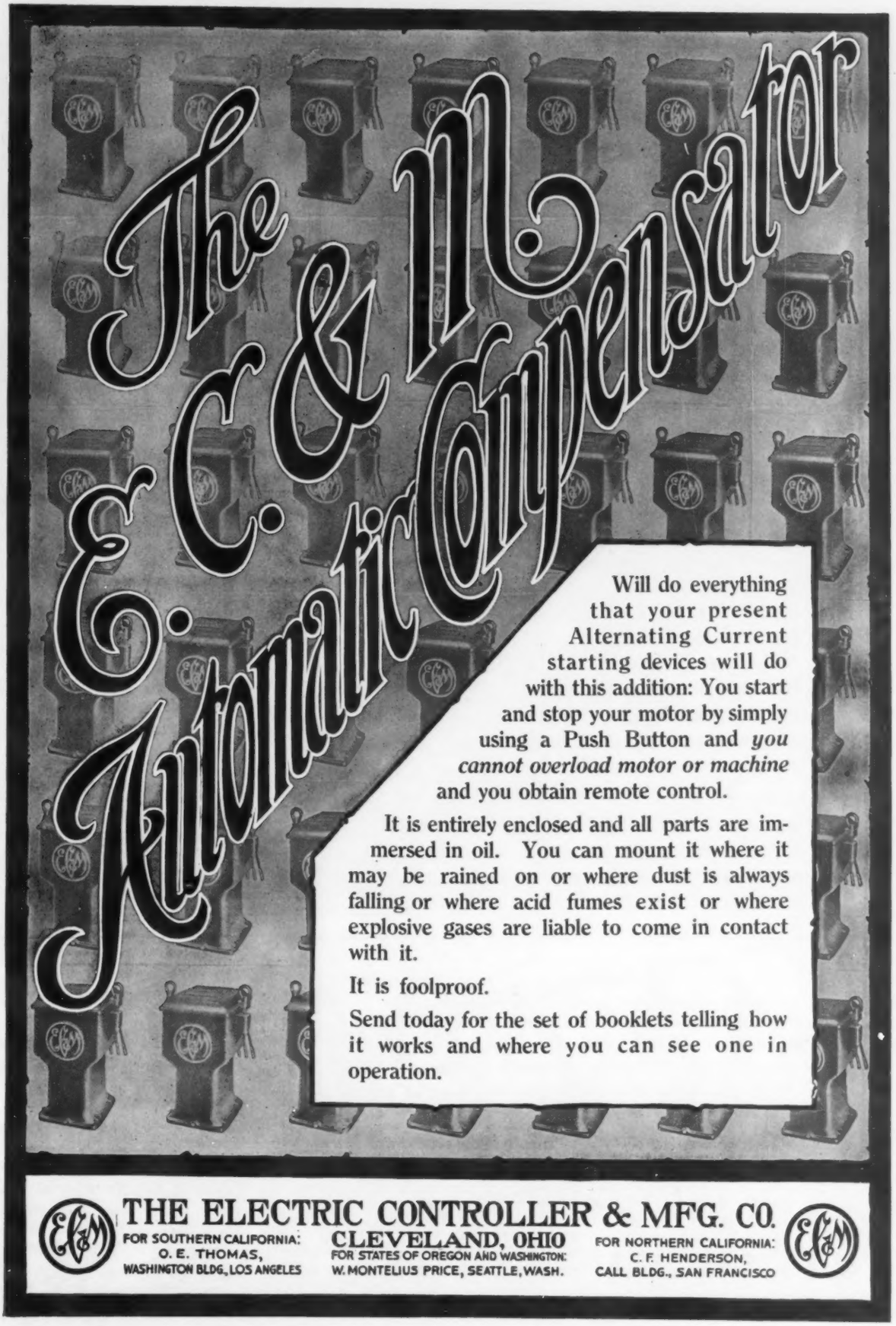
The R & M Motor is the one motor everyone knows about. Every prospective user of a motor driven device whether for home, office, store or factory recognizes the R & M Motor as the best insurance of reliable service from the machine.

From both standpoints — service reliability and salability — manufacturers find many advantages in equipping their appliances with R & M Motors. And for the same reasons, dealers find maximum satisfaction and profit in the sale of devices so equipped.

THE ROBBINS & MYERS COMPANY
SPRINGFIELD, OHIO

Pacific Coast Office — 701-702 Rialto Bldg., San Francisco

Robbins & Myers Motors


The E. C. & M. Automatic Compensator
Will do everything that your present Alternating Current starting devices will do with this addition: You start and stop your motor by simply using a Push Button and *you cannot overload motor or machine* and you obtain remote control.
It is entirely enclosed and all parts are immersed in oil. You can mount it where it may be rained on or where dust is always falling or where acid fumes exist or where explosive gases are liable to come in contact with it.
It is foolproof.
Send today for the set of booklets telling how it works and where you can see one in operation.
THE ELECTRIC CONTROLLER & MFG. CO.
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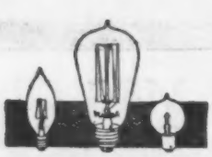
MAZDA

"Not the name of a thing, but the mark of a service"

MAZDA is the trademark of a world-wide service to certain lamp manufacturers. Its purpose is to collect and select scientific and practical information concerning progress and developments in the art of incandescent lamp manufacturing and to distribute this information to the companies entitled to receive this service.

MAZDA Service is centered in the Research Laboratories of the General Electric Company at Schenectady, New York. The mark MAZDA can appear only on lamps which meet the standards of MAZDA service. It is thus an assurance of quality. This trademark is the property of the General Electric Company.



A MAZDA Lamp for every purpose

4643

RESEARCH LABORATORIES OF GENERAL ELECTRIC COMPANY

For Security
"Install the 'FRANKLIN' and Forget It"
INSTALL THE "FRANKLIN" AND FORGET IT!
ELECTRICAL DEVELOPMENT AND MACHINERY CO.
GENERATING STATION EQUIPMENT

CERTAINTY!

Nothing less brings peace of mind.

To be **sure** he is on the right course, a safe course, is the sea-captain's first concern. To be **sure** of your equipment is yours.

You can depend upon the "FRANKLIN" Disconnecting Switch with "FRANKLIN" Positive Lock to keep the circuit closed as long as you want it closed. No expulsion strain can throw out the blade, for the close-locked jaws swing open only in a direction **opposite** to that of the resultant force. They form a complete bridge above the blade.

Yet, an easy pull from any angle, with any hook, opens the jaws and releases the blade in a single continuous motion.

One push closes the Switch. As the blade slips home, the jaws click shut above it. Write for Bulletin No. 1250.

Besides Disconnecting Switches, "FRANKLIN" Generating Station Equipment includes Post Type Insulators, Potheads, Doors for Bus and Switch Compartments, Instrument Cutout Switches, Cleat Type Insulators, Air Pressure Relays, etc., etc. Write for descriptive Bulletins.

SELLING AGENTS

THE PHILADELPHIA ELECTRIC COMPANY SUPPLY DEPT.
132 South Eleventh Street
Philadelphia

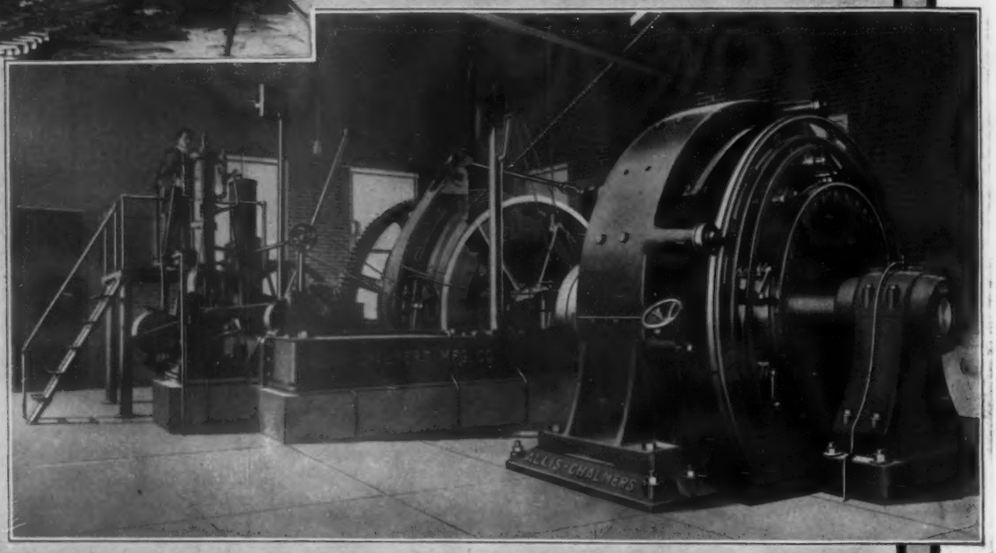
"FRANKLIN"

GENERATING STATION EQUIPMENT

COAL MINE HOISTS

DIRECT CONNECTED HOIST WITH FLY WHEEL SET AND SWITCH BOARD FURNISHED PEABODY COAL CO.,

Capacity 4000 Tons Per 7 Hrs.



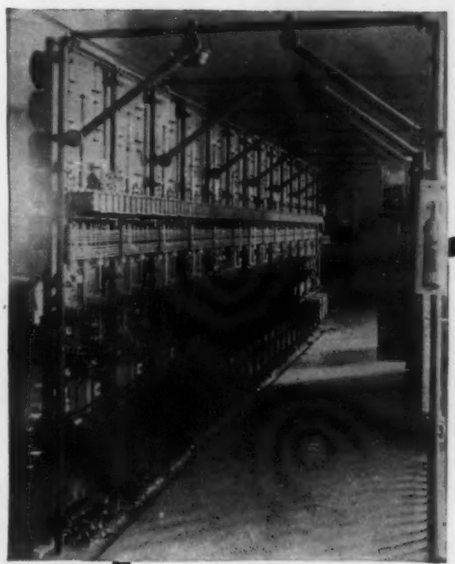
NOTE THESE FEATURES!

1. Hoist Equipped with All Latest Safety Features.
2. Low Power Consumption—High Efficiency.
3. Auxiliary A. C. Motor Drive Included for Night Operation.
4. Entire Equipment Built By "ONE" Manufacturer.

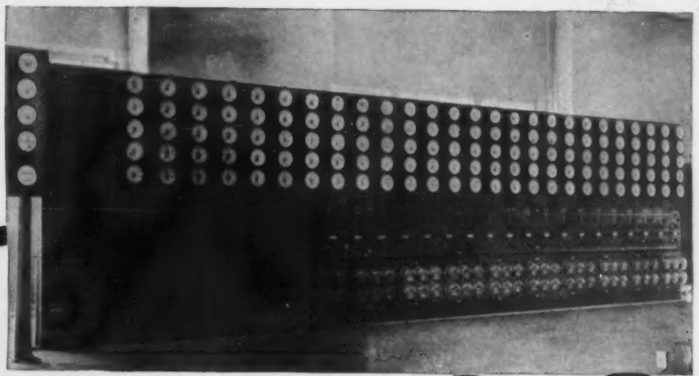
ALLIS-CHALMERS

MILWAUKEE, WIS. U. S. A.

Westinghouse
Switch Gear in Cincinnati



Rear View of Main 13,200-Volt Feeder Board Showing Graphic Meter Panels to rear.



Main 13,200-Volt Feeder Board:-Each of the 14 Panels controls Two 300 ampere, 3-Phase, 13,200 Volt Circuits. Each panel also controls Four 600 ampere Electrically operated Type E-6 Oil Circuit Breakers.

The Union Gas & Electric Company's West End Power House in Cincinnati is one of the most modern in the country.

The initial equipment consists of two 31,250 kv-a 13,200 volt, 3-phase, 60-cycle turbine generators with exciters, and three 1800 kv-a, 13,200/600 volt station auxiliary transformers; twenty-four 300 ampere, 13,200 volt outgoing feeders and thirty 600 volt auxiliary feeders. Ultimate equipment will include 250,000 kv-a in turbine generator units.

Sargent & Lundy, Consulting Engineers, designed and supervised the installation of the complete station equipment.

Representative of the magnitude of this switch gear (Westinghouse throughout) are the sixty, Type E-6; twelve Type 0-2; six 2400 ampere, multipole Type F-3, and fifty-four Type F-2 Oil Circuit Breakers, together with the four-section control desk, illustrated, and a total of approximately 47 panels of control boards.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

San Francisco: 1 Montgomery St. Los Angeles: 7th & Spring Sts. Seattle: Alaska Bldg.

Pacific Coast Distributors:
Electric Railway & Supply Co., San Francisco
The Washington Electric Supply Co., Spokane
Illinois Electric Co, Los Angeles
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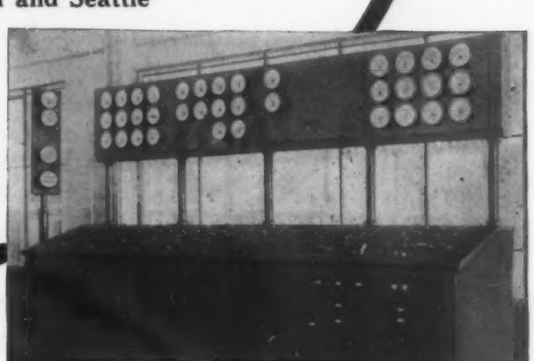
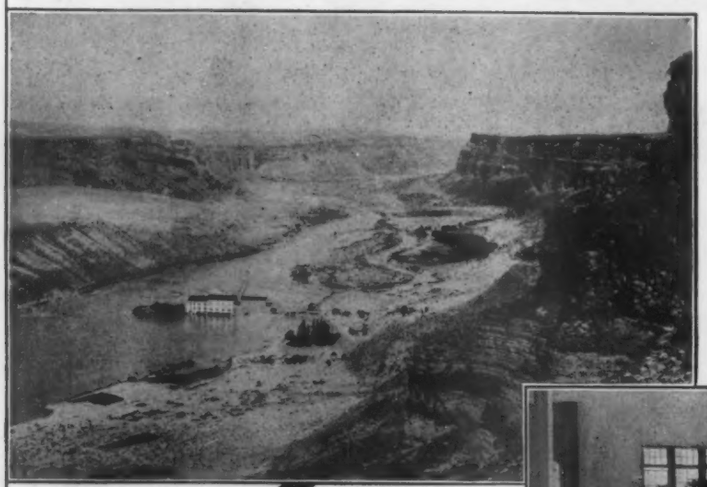
Main 13,200-Volt Type 0-2 and Type E-6 Oil Circuit Breakers and Bus Construction.



Main Control Desk.

Hydro-Electric Power

Water Versus Coal



Idaho Power Company's Plant at Swan Falls, Idaho

The logical answer to the rising cost and uncertain delivery of coal is Hydro-Electric Power.

Westinghouse Water-Wheel Generators

because of their economy and reliability, are giving the most satisfactory service in hydro-electric plants of every description.

Capacities from 30 kilowatts up, with either horizontal or vertical shaft connections.

The illustrations show a "Hydro" plant having two 850 kv-a and four 1560 kv-a Westinghouse Water-Wheel Generators, operating under a head of 21 ft. at 120 and 90 r.p.m. respectively, generating a total of 7940 kv-a at 2300 volts.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.
San Francisco: 1 Montgomery St. Los Angeles: 7th & Spring Sts. Seattle: Alaska Bldg.

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WESTINGHOUSE ELECTRIC

Westinghouse

UNIVERSAL

ELECTRIC IRONS

E905

Full Nickle Finish—Big Heat Storage
Long Life Element—Always Cool Handle

The demand for UNIVERSAL Electric Irons was never greater than it is today. In hot weather every woman is looking for a chance to sidestep all the housework she can and there's nothing that saves her so many steps as the Electric Iron—not any old Electric Iron, but the one that heats quickly, holds the heat and gets the work out of the way without delay—the UNIVERSAL.

UNIVERSAL Iron No. E905 is not cheap in construction, price or service nor does it cheapen the reputation of dealers who sell it. No Iron can be better made or more efficient. It is a soundly built Iron for hardest service throughout years of ironing days. In this Iron there is value—greater we believe, than any maker has ever offered at anywhere near the price.

The Trade Mark known

UNIVERSAL

in Every Home

ELECTRIC HOME NEEDS

UNIVERSAL
Electric Coffee
Percolator No. E 9646

UNIVERSAL
Four Heat Electric
Grill No. E 984

UNIVERSAL Electric Home Needs comprise a wide variety of electrical cooking and heating appliances, each one of which has been designed to fill a distinct need in the home.

Each UNIVERSAL Coffee Urn, Percolator, Chafer or other liquid heater is equipped with our patented safety Fuse Plug (as simple in operation as the fuse which protects the lighting circuit in your home) preventing injury to the vessel should the contents boil dry with the current on.

UNIVERSAL
Electric Toaster
No. E 946

UNIVERSAL
Electric Waffle
Iron No. E 930

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Hubbard & Company
Pacific States Electric Company
Western Electric Company

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Hubbard & Company
Pacific States Electric Company

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V.V. Fittings Company
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Manhattan Electric Supply Co.
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Keeler, White & Company
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National Carbon Company, Inc.
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General Electric Company
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Wagner Electric Mfg. Company
Western Electric Company
Westinghouse Electric & Mfg. Co.

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Holtzer-Cabot Electric Company
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Bolts, Expansion & Galvanized
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Pacific States Electric Company
Western Electric Company

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Appleton Electric Company
Baker-Joslyn Company
Chicago Fuse Mfg. Company
Crouse-Hinds Company
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Pacific States Electric Company
Sprague Electric Works
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(See Wires and Cables)

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Westinghouse Electric & Mfg. Co.

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Mathias Klein & Sons

Manufacturers

Canal Station 34

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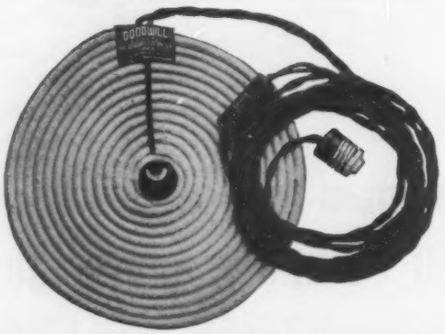
If this is true, — AND IT IS, — can you afford NOT to sell the GOODWILL?



This advertisement is written by an advertising man whose physician, the head of his branch of the profession in the country, recommended the use of this pad. It CURED him.

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is what the user requires of an ignition battery — not only long service but the RIGHT KIND of service. High amperage is an important item of service— so is rapid recuperation after use and very slow deterioration when idle. The

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possesses these qualifications and more because it is not only a battery superior to any other for ignition service — but

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We agree to credit account, replace batteries or refund amount paid for the batteries, including transportation charges, if they do not prove satisfactory.

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Western Electric Company

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Baker-Joslyn Company
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Pacific States Electric Company
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General Electric Company
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V.V. Fittings Company
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General Electric Company
Pacific States Electric Company
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Hubbard & Company
Pacific States Electric Company
Standard Underground Cable Co.
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Pacific States Electric Company
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Hangers, Fixture
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Roller-Smith Company
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Pacific States Electric Company
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Brookfield Glass Company
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Electric Agencies Company
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Locke Insulator Mfg. Company
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Pacific States Electric Company
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Western Electric Company
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CADILLAC ELECTRIC VACUUM CLEANERS sell readily; and give perfect satisfaction to the user with pleasing profit to the dealer. Order from nearest representative.

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All operations from Wire Bar to Finished Product in this Plant

AJAX

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$1.25 Each
3 for $3.50

HIGHLY POLISHED COMPOSITION FINISH
Leaves Lamp in Position Intended
Admits Use of Shade Over Lamp
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No Explanations—No Apologies Needed

Any Jobber — or Direct
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upon the durability and economy of STANDARD Weatherproof Wires and Cables because they have been tested by over 30 years of service.

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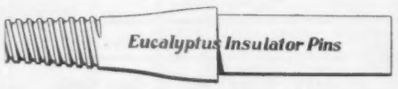

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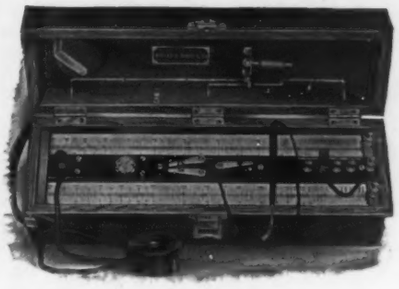

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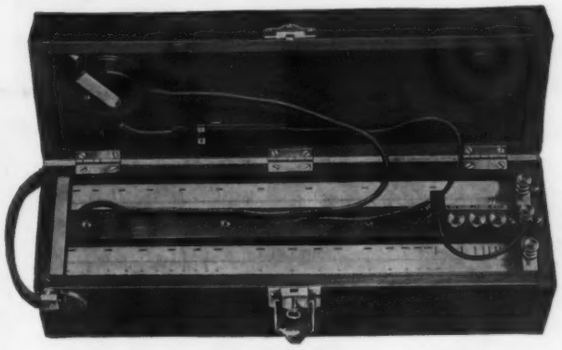
Expressly designed for making resistance measurements quickly and accurately. Is used also for locating breaks, grounds and crosses, for measuring the resistance of electrolytes, for comparing inductances and capacities and for many other purposes.



Telephone type. High range 200,000 or 2,000,000 ohms
Weight—11 lbs.
Size 17″ x 5″ x 5″

Notable for its simplicity and absence of all delicate parts. Is useful for both field and shop testing.

Both types are covered by Bulletin No. 300. Send for it.

There is also the S. S. type (with galvanometer only) — high range 1,000 ohms; weight — 5 lbs.; size — 9½″ x 5″ x 5″. — especially designed for testing resistances encountered in railway signal systems, but is recommended for other work where the resistances to be measured do not exceed 1,000 ohms.

See our bulletin No. 100 for further details

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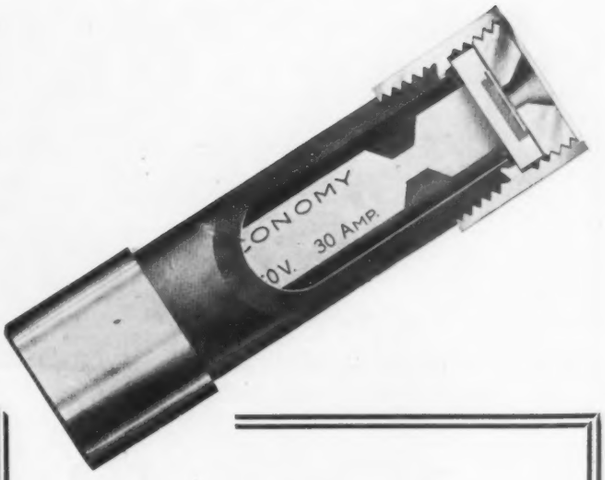

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They are **accurately** rated — efficient in operation. They are **safe** in every respect — not sometimes, but **always.**

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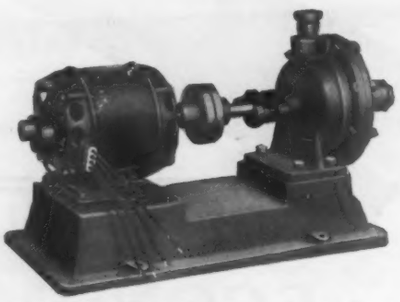
Sole manufacturers of "ARKLESS," the Non-Renewable Fuse with the 100% Guaranteed Indicator

Economy Fuses are also made in Canada at Montreal



1/6 h.p. motor direct connected to a centrifugal pump

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are popular because they are dependable.

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1/10 to 40 H. P.

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are built for those who are looking for real pumping service — not just a pump.

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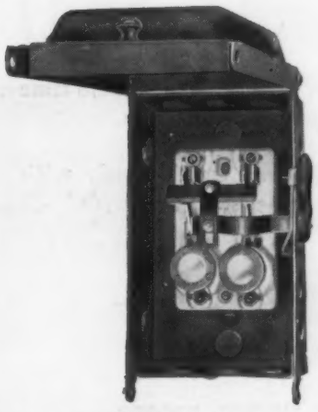

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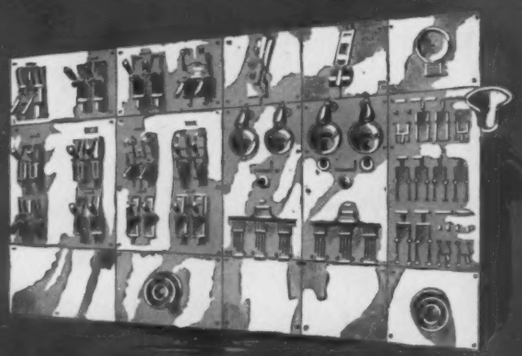

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are automatic self-starting by means of a double throw switch under full load.

reach speed in from 10 to 15 seconds.

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are quiet in operation.

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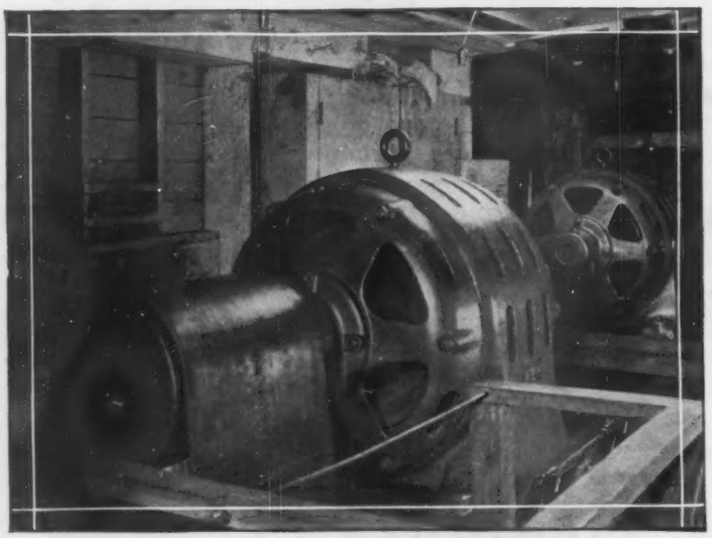

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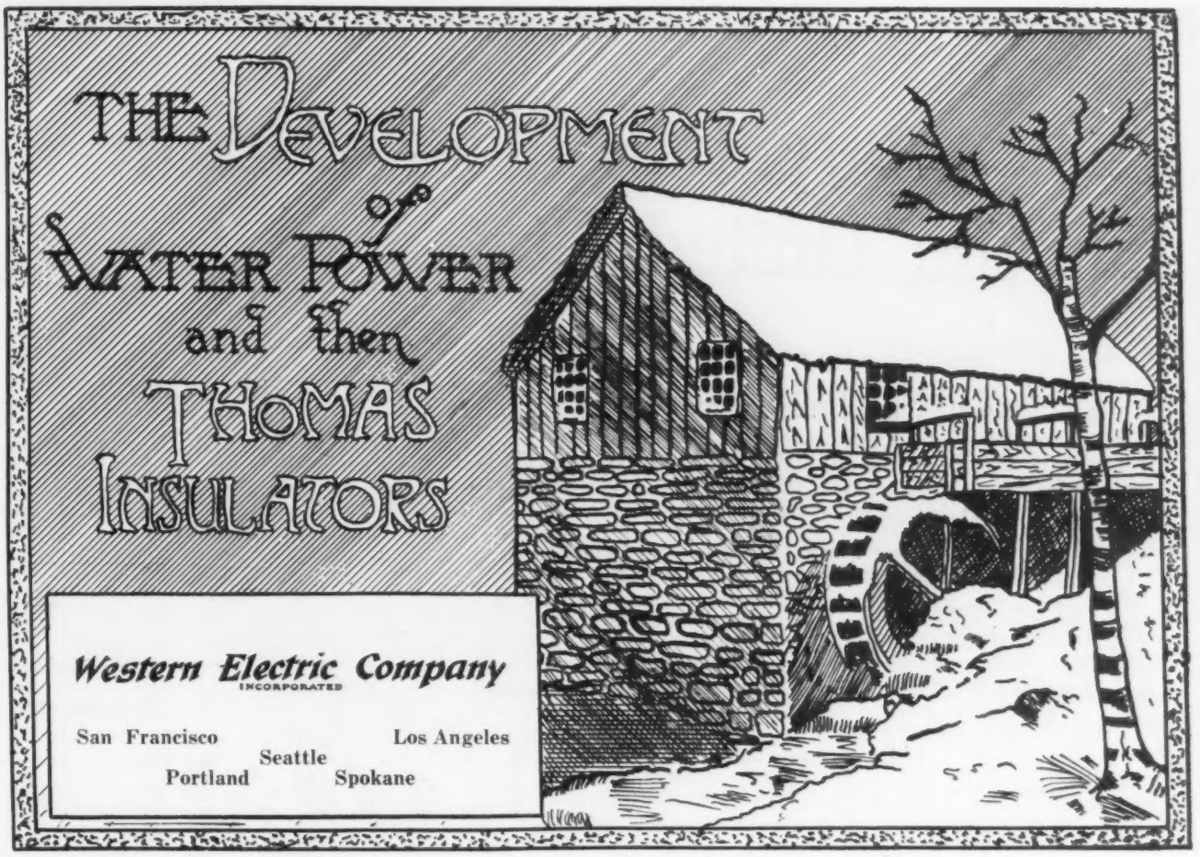

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2018

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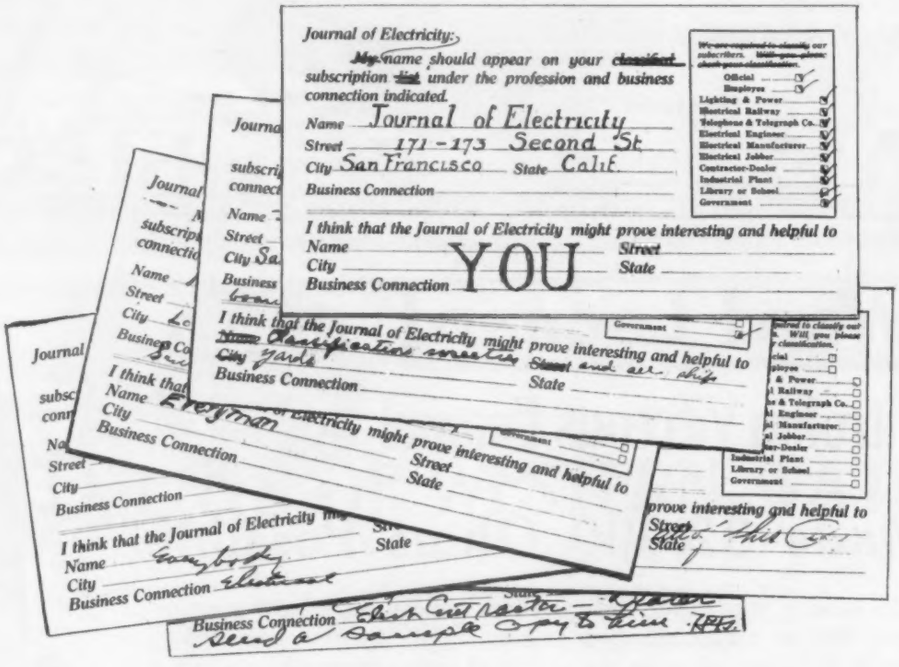

The five lower cards were among the interesting returns sent in by the subscribers of the Journal of Electricity in response to a request for data on their business and position. Are you included among the groups specified by these readers, as one to whom the Journal of Electricity will prove both interesting and helpful?

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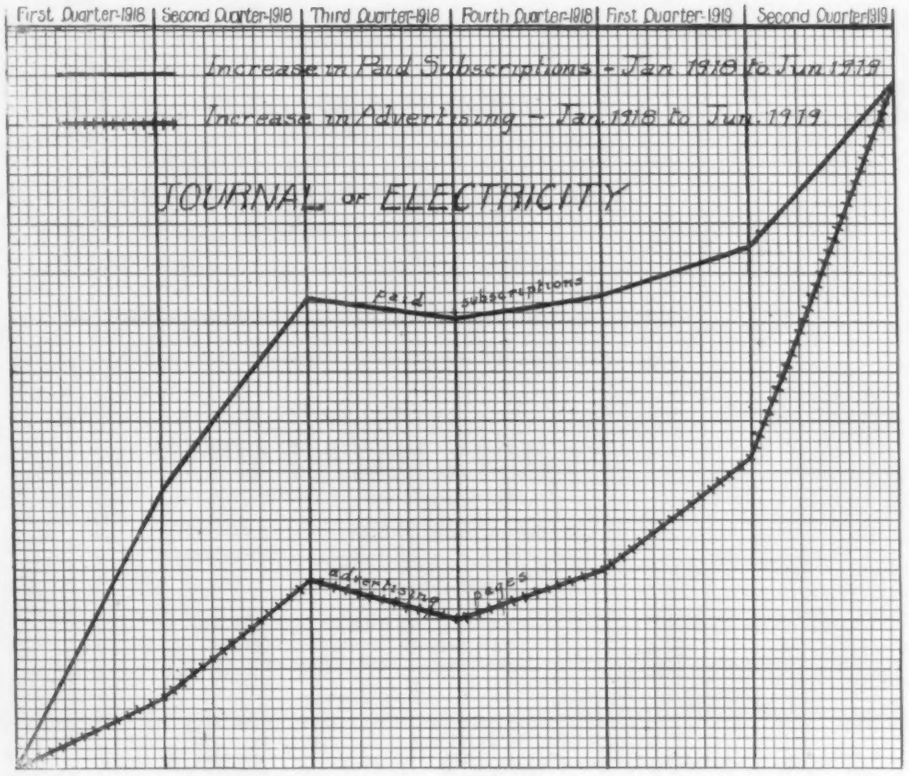
As this graph continues its upward trend, we may soon fulfill the prophecy of our subscriber as expressed on the preceding page and include "everybody electrical" among the interested readers of the editorial and advertising columns of the *Journal of Electricity*.



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An advertising medium meaning more to the electrical trade in the West than any other publication

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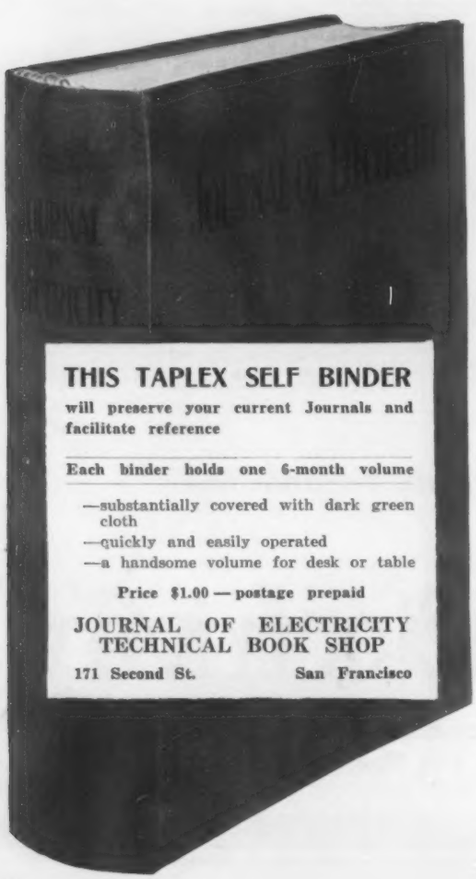

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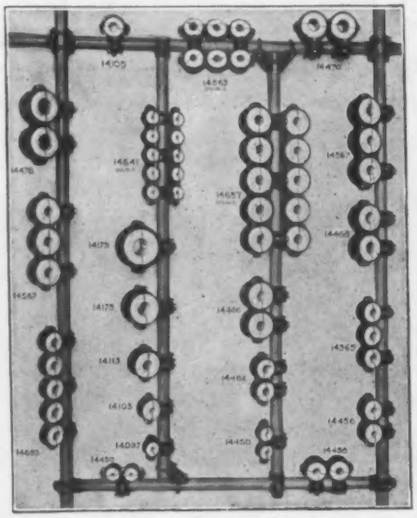

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"All work and no play, makes Jack a dull boy"

Therefore, we've arranged for the annual reception and dance on the 16th; a ride to Waukeshaw Beach, followed by luncheon and an afternoon devoted to sports, on the 17th; and a big dinner on the 18th.

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THE EVENT—Annual Convention of the National Association of Electrical Contractors and Dealers.

THE TIME—July 14th, 15th, 16th, 17th, 18th.

THE PLACE—Hotel Pfister, Milwaukee, Wisconsin.

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AND OTHER CONDUIT FITTINGS

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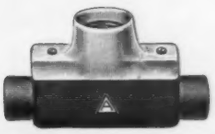

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The extra quality is more than worth the extra cost. Increased annual sales for over a quarter century shows others have found it so.

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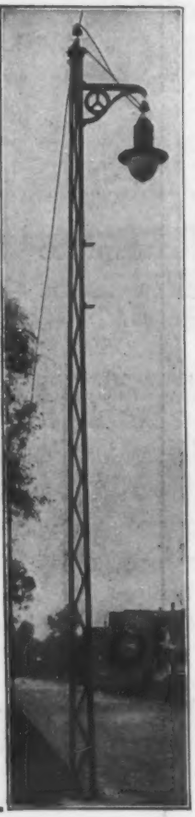

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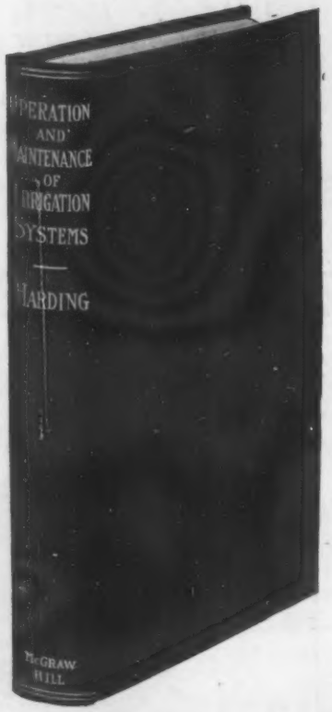

THIS book treats of a branch of irrigation work heretofore not fully covered. The design and construction of irrigation projects have been worked out in considerable detail, but this book meets the real need for definite and practical data on the **operation and maintenance** of the systems.

Operation and Maintenance of Irrigation Systems

By S. T. Harding

Assistant Professor of Irrigation, University of California

271 pages, 6 x 9, fully illustrated, $2.50 (English price 10/6) net, postpaid.

The author has written the book from his experience and observation of existing irrigation systems, and from a broad study of available literature on the subject. Only the standard and proved methods are set forth.

The costs of operation and maintenance, and the organization of the work are given special attention.

The legal aspects and the rate problems are discussed in detail.

This is an excellent companion volume to Etcheverry's "Irrigation Practice and Engineering," the standard reference work on the subject.

CONTENTS

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ELECTRICAL SPECIALTY COMPANY

525 Market Street San Francisco, Cal.

Weston **Electrical Indicating Instruments**

are unqualifiedly superior to any other instruments designed for the same service.

A.C. or D.C. Switchboard or Portable Instruments for every field of Indicating Electrical Measurement. In writing for catalogs and bulletins, please specify the field that interests you.

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"THE EVERLASTIN' TEAMWORK OF EVERY BLOOMIN' SOUL"

It Won the War—It Will Bring Prosperity

Extracts from article by George E. Roberts of
The National City Bank in American
Magazine last February

"If we can get rid of the vicious doctrine that there must be conflict between capital and labor, we ought not to find any insurmountable difficulties in our path. That idea is a false one, and must be recognized as such by both sides. Their interests are absolutely mutual, and if they work together on this plane both of them will benefit.

* * *

We have shown what we can do if we all pull together. If we work with the same zeal, energy, unity of spirit, and use all the productive forces of the country as effectively in supplying the ordinary wants of the people as we have worked in carrying on the war, it will be possible to accomplish all that has ever been hoped for in improving social conditions. And when we say social conditions, we might as well say business conditions, for that is really what it amounts to. Social conditions depend on business in its broad sense; for business is what feeds and clothes us, educates our children, pays our doctors' bills, takes us to the theatre or the "movies," keeps our churches open, and makes life what it is.

* * *

I believe in labor being well paid. We have always had the highest wage scale in the world, and we want it to be always the highest in the world. But we have learned one thing of importance. It is that the vital point about wages is not the rate per day or per week, but the rate per unit of production. That is the key to the industrial problem. Efficient labor is worth high wages. But the man who demands high wages, without giving efficient production in return, injures himself and is unfaithful to the wage-earning masses. He adds to the cost of the necessaries and comforts, which his fellows must buy.

Suppose he is making hardware. If he gets high wages for poor work he increases the cost of hardware. The result is that the man who is working in the cotton mill in Massachusetts will have to pay more for his stove, or his tin pans, or whatever he buys in that line. He will be forced to demand more for his own labor. The cost of cotton goods then goes up, and the original man, the hardware worker, has to pay more for his shirt, his underclothes, all the cotton things he buys for his family.

This is not a question of class interests, but of obligations between people in the same walks of life.

As for the employer, it is to his interest that employees as a class shall be well paid. The higher their purchasing power the better it is for business in general. We have got to get this into our heads as a people: that we are not independent of one another; that the honest prosperity of each one is beneficial to the rest of us. That is the secret of prosperity: mutual interest, cooperation. Efficient workers, well-paid workers, we must have. But they must realize their obligation to be efficient as well as their desire to be well paid. And the employer must understand that a vast body of workers with a great purchasing power forms the true foundation of prosperity.

* * *

We are all in this business of peace just as we are all in the business of war. The way to win it is to work together and to work individually just as efficiently as possible.

* * *

To the extent that we realize this fact, that we are all dependent on one another for prosperity, to just that extent are we likely to have prosperity."

Let's Go!

PASS & SEYMOUR, Inc., Solvay Station, Syracuse, N. Y.

Export Dept., 6 Church St., New York City

NEW YORK BOSTON PHILADELPHIA CHICAGO

LF Ja '22

NATIONAL
MAZDA
THE WAY TO
BETTER LIGHT
NATIONAL LAMP WORKS
OF GENERAL ELECTRIC CO.
A
NEW ARRIVAL
IN THE MAZDA FAMILY
The National MAZDA C-4 Lamp
Thousands of homes are waiting to welcome this newcomer, for it represents the most important development in home lighting since the very first MAZDA lamp came to show the way to better light.
The National MAZDA C-4 lamp is of gas-filled construction, with a tipless bulb of white glass which conceals the filament, and softens and diffuses the light. It is made in the 50-watt size only.
A double-page advertisement in colors, in the Saturday Evening Post of August 30th, will announce the new lamp to the householders of the country. National MAZDA agents will do well to anticipate the enthusiastic demand that is sure to come.
NATIONAL LAMP WORKS
of General Electric Company
Nela Park, Cleveland, Ohio

The New Milk-white tipless MAZDA C-4 Lamp

ANOTHER epoch-making attainment for MAZDA Service! This milk-white, **tipless**, gas-filled Mazda C-4 lamp is the culmination of years of endeavor to produce mellow, glareless, efficient, white light and to remove the tip. One size only — 50 watt, 110 to 125 volts.

The outstanding characteristics of this lamp make it **the** lamp for nearly all but industrial lighting. Without change of equipment, Mazda C-4 lamps may be substituted for standard, clear Mazda B lamps of 40, 50 or 60 watts.

The efficiency of the Mazda C-4 lamp is somewhat higher than that of the 50-watt clear Mazda B lamp.

Orders for Edison Mazda C-4 lamps will be acceptable after July 1, 1919.

EDISON MAZDA

47D-53

EDISON LAMP WORKS OF GENERAL ELECTRIC COMPANY

"Light" and "illumination" are not always the same—but light, plus scientific application, gives ideal illumination.

Why Niagara Falls Likes its Street Lighting

America's greatest show place has just installed on its residence streets the new Novalux unit with stippled globe and Holophane dome refractor.

This globe

gives a live, sparkling light

eliminates glare

gives perfect diffusion

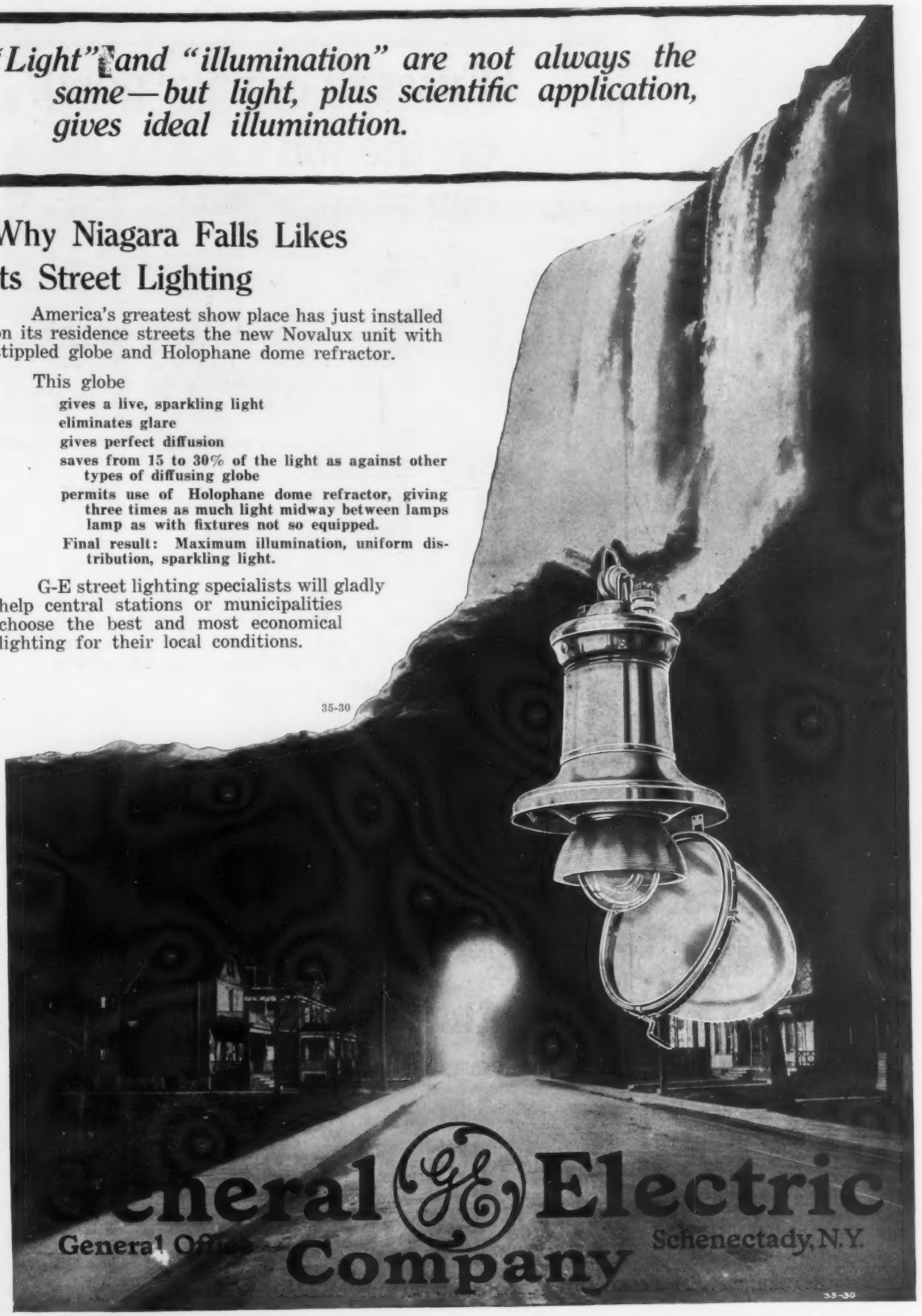
saves from 15 to 30% of the light as against other types of diffusing globe

permits use of Holophane dome refractor, giving three times as much light midway between lamps lamp as with fixtures not so equipped.

Final result: Maximum illumination, uniform distribution, sparkling light.

G-E street lighting specialists will gladly help central stations or municipalities choose the best and most economical lighting for their local conditions.

35-30



Fuses that make good on the job will move off the shelves

The absolute reliability which has always been built into G-E enclosed fuses now characterizes all the parts of

Renewable Fuses

They will make good on the job because they are simple in construction, quickly refilled and accurately rated — they embody all the best features of this type of fuse.

G-E Renewable Fuses will sell because of these good qualities and because they are backed by the G-E selling plan. Sales helps for dealers are being prepared and will soon be available.

G-E Reliable Wiring Devices

are distributed by the

PACIFIC STATES ELECTRIC COMPANY

Los Angeles Oakland Portland San Francisco Seattle Spokane

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Rocky Mountain Sales Offices in:
Denver, Colorado, and Salt Lake City, Utah

41-50

The same far-reaching publicity that has popularized MAZDA Lamps is being consistently applied to G-E Motors

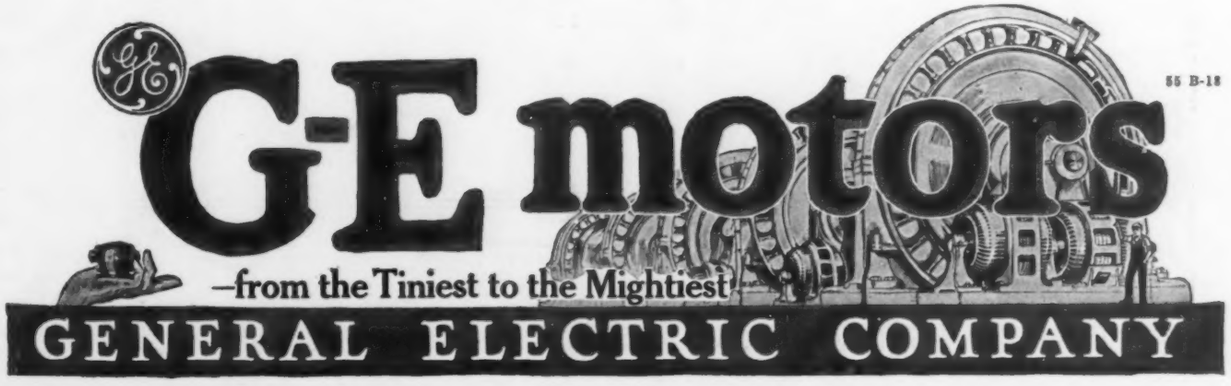
Advertising That Moves Your Stock

The two-color illustration above will compel attention to the G-E Motor advertising in the Saturday Evening Post of June 28th and Good Housekeeping for July.

It is a *washing machine* advertisement. It will move *all* washing machines —particularly G-E motored washing machines.

All G-E advertising is designed to move *all* your stock, to keep it moving, to quicken your turn-over.

This advertising assistance—together with quick-action dealer helps and tie-in window displays—makes happy business men of dealers who sell products "equipped with General Electric motors."



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THEO F. DREDGE, Pacific Coast Representative

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SPRAGUE CABLE TRADE MARK BX REG. U.S. PAT. OFF.

A FLEXIBLE ARMORED CONDUCTOR for wiring purposes

Manufactured by

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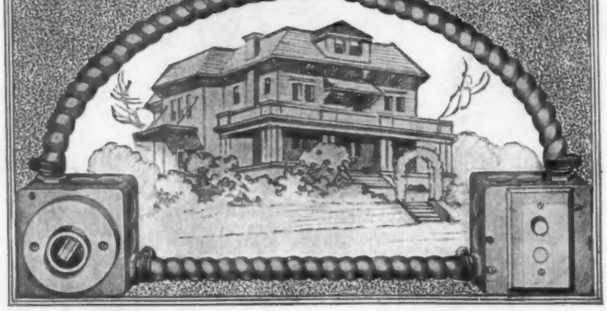

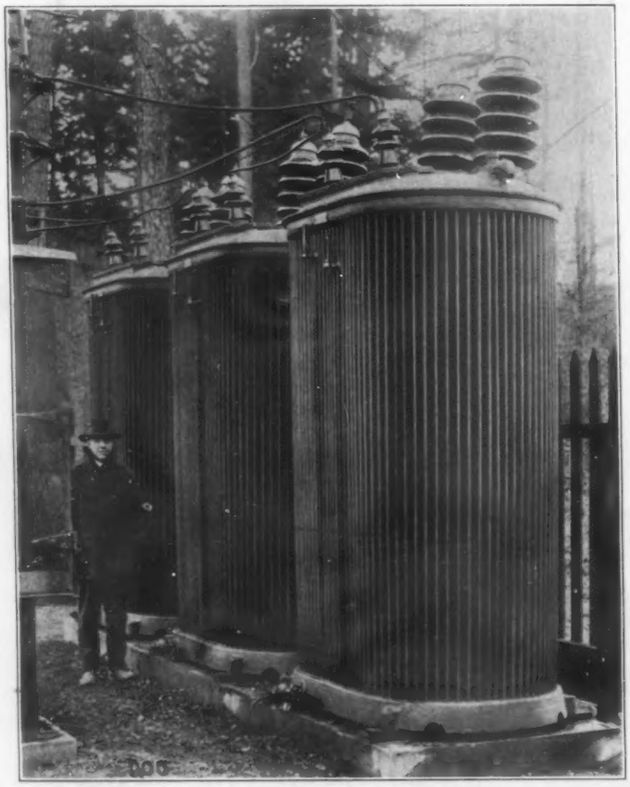

A Puget Sound Installation of 60,000 Volt Moloney Transformers

To insure satisfaction specify

MOLONEY Transformers

Made by specialists exceptionally well equipped with manufacturing facilities

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